APPENDICES

Appendix A
Chronology of Events at New River

The following information has been gathered from historical documents and journals, newspapers, personal interviews, and BLM record and correspondence files. Some dates are approximations. Prehistoric Native Americans events have not been included in this chronology as sufficient information is not yet available to understand the environmental and cultural changes which have occurred during the last 10,000 years. Native Americans believe they have resided in the area since the beginning of time.

1826 – Alexander McLeod a trapper for the Hudson's Bay Company and his men head south on a journey to explore from the Umpqua to the Rogue River. When he reaches Floras Creek, he writes, "[We] passed a small river named by the natives 'Chiste Etudi.' [We] formed our camp near where our people were lately trapping, on the border of an extensive marsh or swamp." Because of the presence of a considerable outlet from the lake, he was forced to hire Indian canoes to reach the main Indian village on the northeast end of Floras Lake.

1828 – Jedediah Smith and 18 men travel up the beach in front of the deflation plain which would later become New River, on their journey up the Oregon coast as they searched for beaver pelts.

1851, June – John Kirkpatrick and eight men cross the New River country during their escape from an Indian siege at Battle Rock near Port Orford. Kirkpatrick, in describing the area around New Lake, writes "about three o'clock the next day, we came to the edge of what seemed to us a large plain. It looked to be miles in extent, and was covered with a heavy growth of high grass, and proved to be an immense swamp. We now determined to try and cross this swamp and reach the sea after dark and travel all night. We floundered around in this swamp all night, sometimes in water up to our armpits, until after dark we found a little island of about an acre of dry land and covered with a thick growth of small fir bushes. Here we lay down and tried to rest and sleep but encountered a new enemy in the shape of clouds of mosquitoes."

1852 – The U.S. Army establishes a post at Port Orford and begins patrols into the surrounding countryside to control Indian activities. They graze their considerable horse herd on the lush prairies along lower Floras Creek.

1856, Spring – All of the Indian tribes from the Coquille to the Chetco River rebel against the invasion of white settlers and miners into their territory. The settlers stay at a fort in Port Orford until the Indians are defeated by the U.S. Army and deported to a reservation in northern Oregon.

1856 – At the end of the Rogue Indian War, settlers begin taking out donation land claims between Floras Creek and Bandon. The discovery of gold in California creates a tremendous market for farm produce, including cheese and butter, salted beef, and mutton. Farmers haul their goods by wagon to Port Orford or Bandon, where they are loaded on schooners and shipped to San Francisco. Among the earliest settlers were Isham Cox, Chris Long, William Langlois, A.H. Thrift, and Shipman Crouch. Ditching and draining of wetlands begins.

1857 – Daniel and Mathew Murphy, General Land Office surveyors, surveyed portions of the New River area.

1865 – The McClellens establish a ranch at New Lake.

1868 – A tremendous forest fire burns between Port Orford and Bandon, destroying most of the settlers' homes and livestock. The extensive elk herds that once grazed on the Floras Creek river bottoms are almost wiped out.

1873 – William Gallier establishes the New Lake Dairy on the east side of the lake.

1876 – Settlers on lower Floras Creek include the Brocks, Chris Long, William Langlois, William Burris, Jonathan Scott, Edward Burroughs, Al Thrift, and the Burnaps.

1880 – Frank Langlois and A.H. Thrift form a partnership for the establishment of a store on the Langlois farm a mile west of the present town of Langlois.

1880 – The mail route between Bandon and Langlois follows the beach from to near Croft Lake, where it turns inland and follows the ridge bordering the north side of Conner Creek. From this point, it turns south and follows the present course of Highway 101.

1880 – William Wright, a General Land Office surveyor, completed surveys for the New River area.

1881 – A post office is established at Langlois.

1889 – The town of Dairyville (present day Langlois) is platted in 1889 by A.H. Thrift. Thrift's farm is located on the north side of Floras Creek and west of the present town of Langlois. Historian Orville Dodge writes in 1898, "We refer to A.H. Thrift, whose broad acres of rich bottomlands join the town plat and support a hundred cows of improved blood."

1890 – A tremendous flood wipes out some farms along Floras Creek, and the floodwaters flow through the deflation plain north of Floras Lake outlet, prompting local rancher, Louis Knapp Sr., to say that it looks like a new river.

1893 – Starr Dairy, the largest dairy ranch in Curry County, milks up to 150 cows daily. This ranch is located north of Willow Creek.

1897 – Floras Creek and the outlet of Floras Lake join to form a short river that runs north for about one mile and enters the ocean southwest of New Lake. New Lake and surrounding marshes are drained by a short river that enters the ocean northwest of New Lake. Fourmile Creek is the third outlet shown entering the ocean northwest of Croft Lake. Croft Lake is drained by a narrow channel that flows south into New Lake. These streams are connected by a deflation plain extending from north of Floras Lake to Laurel Lake that fills with water each winter. The beach in front of this deflation plain is very flat and is constantly breached in different locations.

1900 – Several families of Native Americans obtain allotments in the hills east of New River, along Fourmile and Floras Creeks. They work part-time for local ranchers.

1900 to 1935 – Each fall, New River is artificially breached by farmers who supplement their income by gillnetting salmon for sale to local canneries. The location of the breach changes often as adjacent landowners compete to see who can get to the salmon first.

1903 – Maps drawn in 1903, 1913, 1932, and 1936, all show New River as a contiguous stream running from Floras Lake to the outlet west of Croft Lake. These maps also show that New River has a second mouth located southwest of New Lake. Through most of the year, Floras Creek and the outlet of Floras Lake flow

through the southern breach, while New Lake drains into the northern breach. The two systems are connected only during periods of high winter runoff. Local residents refer to the outlet of New Lake as New River.

1903 – Wallace Pomeroy homesteads on the southeast side of New Lake.

1911 – Edith Gallier and her family move to the New Lake Dairy. Edith attends school in a one-room schoolhouse at New Lake, where the first eight grades are taught.

1915 – One of the earliest cranberry bogs in the Bandon area is built on the east side of Muddy Lake by Henry Eden and Dr. Roland Leep. The spruce swamp is cleared by hand, and a steam donkey is connected to a haulback to obtain sand from dunes east of New River. These bogs are hand picked by local women who are hired each fall and paid in vouchers that can be redeemed at several Bandon businesses.

1915 – Hans Hansen leases the Starr Ranch, and milks 150 to 175 cows daily. He soon establishes the Langlois Cheese Factory and begins producing blue cheese in 1931. By 1941, the Langlois plant is producing half a million pounds a year.

1917 – Joseph Stankevich, a pioneer cranberry grower in the Croft Lake area, crosses the McFarlin cranberry vine with wild vines from a marsh at New Lake to create the *Stankevich* variety. This variety produces well and is planted in several of the bogs built by Eden and Leep northeast of Muddy Lake.

1930 – European beach grass, first introduced to the Oregon Coast in the 1891, becomes established in the New River area, and a beach ridge begins to form along the coast from Floras Lake to Fourmile Creek.

1920 to 1940 – Farmers attempt to gain new grazing land by draining the marshes south of New Lake. A. H. Thrift is the first rancher to construct a ditch using a steam donkey on a sled. Bono Ditch is created, and Hansen Slough and Langlois Creek are straightened and deepened to drain excess water from shallow lakes and marshes, and to provide additional grazing for the large dairy herds of Joseph Bono and Hans Hansen.

1939 – Shirley Brown acquires a 220-acre ranch at the mouth of Fourmile Creek, which at this time runs due west into the ocean. He operates a dairy and grazes cows in the area from Croft Lake to Twomile Creek.

1939 – The Croft and Muddy Lake property is purchased from Isaac Storm by George Taylor, and the Croft Lake Club is founded.

1940 – Although the beach ridge continues to grow, there are still separate outlets for Floras Creek, New Lake, and Fourmile Creek. A 1939 aerial photograph shows the outlet of Floras Creek to the west of Bono Ditch. The photograph also shows some foredune development near the outlet of New Lake.

1943 – Louis Knapp, Jr., purchases the historic 840-acre Thrift Ranch and begins farming it in 1947.

1945 to 1955 – A popular sport fishery develops in Bono Ditch with trolling for coho salmon. Most of the New River salmon run migrates through New Lake and Bono Ditch into lower Floras Creek. The section of New River west of New Lake carries water only during mid-winter.

1947 – Gerald Kamph purchases the Joseph Bono property south of New Lake and begins ranching.

1950 – The New Lake Gun Club builds a clubhouse on the east side of New Lake. Duck and goose hunting is excellent and is enhanced by planting of grain in fields near the lake.

1950 – Extensive plantings of shore pines are made on the Storm Ranch in an attempt to control shifting sand dunes. The trees begin to spread and cover much of the terrace bordering the east side of New River.

1951 – Lloyd Collins, University of Oregon archaeologist, records a prehistoric site at the ocean entrance of New Lake. He further notes that the shell midden has been "wave-washed and largely destroyed," indicating the site's proximity to the mouth of the river.

1954 – A pronounced foredune covered with driftwood and clumps of beachgrass has developed along New River; and Floras Creek, New River, and Fourmile Creek are combined to form one system, with the outlet northwest of Croft Lake. The river is very shallow with a sandy bottom and supports little vegetation.

1955 to 1976 – Jack and Ruth Storm attempt to wrest a living from the Storm Ranch, which is mostly comprised of shifting sand dunes and swampland. They feed 50 to 100 head of beef cattle, harvest cranberries from the old Westmoor bogs, charge fishermen an access fee, and sell Indian artifacts excavated from several of the village sites located on their property.

1955 to 1976 – An intensive sport fishery develops at the mouth of New River. Local landowner Jack Storm controls access to the fishing, and charges a one to two dollar entrance fee. Several thousand fishermen visit his property each year, and catch large numbers of coho and Chinook salmon and steelhead. He artificially breaches the river each fall in front of his property to control the fishery and to maintain a deep lagoon (10 to 15 feet deep) at the river's mouth. In 1970, the Oregon Fish Commission begins stocking Floras Lake with coho smolts, which greatly enhances the New River fishery.

1960 – The McKenzie family purchases the New Lake Ranch from Fraser and Graham. They continue to maintain Bono ditch south of New Lake. Public access is allowed for hunting and fishing.

1960 – The Croft Lake Club becomes the Croft Lake Association, and is incorporated with Don Farr of Coquille as trustee. Members are encouraged to preserve the natural condition of the area as much as possible.

1961 – The Brown Brothers raise beef cattle on a 500-acre ranch at the mouth of Fourmile Creek. Their cattle range as far north as Twomile Creek. They sell out to the Bussmann family in 1979.

1963 – A major flood occurs at Christmas, inundating much of the farmland around New Lake and lower Floras Creek. New River is artificially breached near Floras Lake to help alleviate the flooding. This was an emergency measure that was not carried out again for several subsequent years, probably because of the influence of Jack Storm.

1964 – The State of Oregon establishes a minimum stream flow of 10 cfs for July and 5 cfs for August and September on lower Floras Creek to protect fishery values. This validates the state's water right and gives them priority over any other rights filed after 1964, but 18 permits established before 1964 are not subject to shutdown regardless of stream flow.

1968 – After renting for several years, Rod McKenzie purchases the Starr Ranch from Buffington and Crook. He receives permission from the state to straighten portions of Floras Creek to clarify property boundaries and decrease flooding problems. Hunters and fishermen are granted access to the Starr Ranch, providing some of the best waterfowl hunting along the coast.

1969 – The Oregon Beach Bill undergoes final revisions and is implemented. This establishes the state's right to a recreational easement west of the vegetation line. Along New River, the easement is determined to be along the east bank of the river.

1970, Winter – Bono Ditch becomes clogged with debris after a flood, and New River begins to increase in size and depth as a result of the increased flow that is diverted away from the ditch.

1973 – BLM District Wildlife Biologist/Recreation Planner, Dick King, prepares a report on New River identifying the outstanding recreational potential of this area. He proposes that the BLM obtain a right-of-way to New River and develop a campground along Croft Lake Lane. Also identified in this report are concerns for the Snowy Plover, which is rapidly declining in number.

1973 – BLM cadastral crews survey New River and set property corners for the fist time. Some of the federal holdings here are accreted lands that have built up after beachgrass stabilized the foredune west of New River.

1973, November – New River is artificially breached at the bend in Floras Creek for the first time since the Christmas flood of 1964. This breaching is unauthorized and provokes a great deal of opposition from local sportsmen and Jack Storm. BLM representatives attend a hearing at Langlois to help resolve the differences between Storm and the newly-organized Floras Creek Water Control District, which is comprised of local ranchers. The BLM adopts a position supporting artificial breaching of the seawall near Hansen Slough between November and December of each year to help alleviate flooding, yet not interfere with the popular fall sport fishery. This artificial breaching continues periodically into the late 1990s.

1977, Spring – Alan Haga and other local landowners construct a "check dam" at the outlet of Floras Lake to maintain the lake level during a severe drought.

1977, July – Jack Storm sells his ranch to Arthur Allen. Allen closes the only access road to New River and discourages any public use of the area.

1977, November – Rod McKenzie offers to grant the BLM an easement across his ranch north of New Lake. Several potential problems are identified during an initial survey of this route, including the high cost of building a road through the New Lake marsh, the potential for disturbing populations of sensitive plants, and the fact that this road would provide access too far south of the desired fishing on the northern part of New River.

1977, December – Federal and state law enforcement personnel arrest Arthur Allen and several accomplices for smuggling 17 million dollars worth of marijuana through the Storm Ranch from a ship anchored offshore.

1978 – The Storm Ranch is purchased by the Wilson sisters, who are members of a popular rock group called Heart. They hire Mike Rainwater as ranch manager and use the ranch to train thoroughbred horses. Several riding trails are developed and used by the Rainwaters and other local residents.

1980 – The BLM adopts a ten-year Management Framework Plan that calls for the designation of New River as an Area of Critical Environmental Concern (ACEC). The plan includes: protection of outstanding wildlife and visual resources, acquisition of an easement to provide access for management and recreational purposes, and protection of sensitive plants from grazing and off-highway vehicle use.

1980, October – BLM lands at New River are closed to off-highway vehicle use to prevent damage to fragile ecosystems, special status and/or sensitive plants and animals, and archaeological sites.

1981, June – Recognizing that enforcement of the OHV closure on BLM lands is impossible when adjacent state lands are open to OHVs, the BLM asks the state to close their lands to the north and south of New River to OHVs. The state begins to study this request.

1981, June – John Christy of The Nature Conservancy completes a botanical survey of New River and the Storm Ranch. He concludes that most of the native plant communities have been badly disturbed by grazing and that the only plant of concern on BLM lands is the silvery phacelia. Other botanical surveys reveal that the river corridor supports an increasing cover of vegetation as it becomes more stabilized.

1981, July – Judith Wickham completes a bird inventory of the New River area for the BLM. She discovers 13 Western Snowy Plover nests, none of which have a successful hatch. Subsequent inventories by the Oregon Department of Fish and Wildlife reveal that New River has either the largest (or second largest behind the North Spit at Coos Bay) breeding population of snowy plovers on the entire Oregon Coast.

1981, Winter – Heavy flooding and high winds precipitate a major move northward by New River. The mouth of New River moves from Storm Ranch to the north of Fourmile Creek. This move is consistent with a gradual northward movement of the river since 1950, when the foredune became more established with European beach grass. The location of the mouth was somewhat consistent during the 1960s and early 1970s when Jack Storm artificially breached the river each fall near the Storm Ranch boat launch. Since Storm sold his ranch, the river is allowed to breach naturally most years, and has slowly carved its way north through the foredune.

1982 – The U.S. Fish and Wildlife Service becomes alarmed at the number of Aleutian Geese that are being killed by hunters each fall near New Lake. They close the New River area to goose hunting and begin monitoring goose migrations each spring and fall.

1982, January – Pan Aero Corporation applies for a permit to construct a wind energy farm on BLM lands at New River. Their application is eventually rejected based on conflicts with special status species and visual resources.

1983, June – BLM lands at New River are designated an ACEC, and development of a management plan is begun.

1983, December – A BLM management plan addressing the need for acquiring access to New River is completed. The preferred route is across a private parcel between Lower Fourmile Road and New River.

1983, November – The State Parks Department informs the BLM of their plans to improve vehicle access to the beach at Bandon State Park, This plan is opposed by the BLM due to its potential to increase unauthorized vehicle use at New River. The plan is subsequently modified to eliminate any improved access.

1984, August – The Oregon Natural Resources Council (ONRC) sends a petition to the Division of State Lands and Department of Transportation asking for a hearing to close all coastal estuaries to OHV use, as well as several specified beaches including New River. This hearing is held at Coos Bay in November. After taking public testimony, the Division of State Lands and State Department of Transportation set up task forces in each coastal county to develop an OHV use plan.

1985, April – A meeting is held with local ranchers Gerald Kamph and Rick McKenzie to address the need for fencing the ACEC. An agreement is reached with Kamph, who finishes fencing the southern boundary of the ACEC by August.

1985, August – While helping Gerald Kamph build the fence at the southern boundary of the ACEC, BLM employees discover that the river has dried up between Hansen Slough and New Lake, causing a

considerable loss of salmon and steelhead smolts. The Kamphs complain that several of their cows have died after drinking brackish water, indicating a possible saltwater incursion into the water table.

1985, August – The Oregon Department of Transportation meets in Coos Bay and considers a recommendation to close the beach from Twomile Creek to New River. Strong opposition from the Coos County Commissioners defers a decision on this matter. The commissioners contend the beach closure would infringe upon the public's right to use the beach.

1985, September – County Watermaster John Drolet is contacted regarding the lack of water in New River and shuts down several irrigators who do not have valid water rights. Early September rains help to alleviate the water shortages.

1986, June – Rick McKenzie signs a cooperative agreement to build a fence along the east side of New River to keep his livestock out of the ACEC. In return for fencing out 26 acres of his own land, McKenzie is allowed to use the ACEC for grazing during the month of August.

1986, September – BLM fishery biologists complete a two-month inventory of New River. They observe that surface flow in portions of New River between Bono ditch and New Lake outlet was often greatly reduced or interrupted for several weeks during late July/August. Reduction in flow can lead to isolation of fish, warming of water temperature, and high fish mortality due to suffocation, stress and predation.

1986, Fall – BLM successfully completes a land exchange for the 14-acre Toth property located on Lower Fourmile Road, which provides public access to New River.

1987, January – Oregon conservation groups make the acquisition of available private lands along New River a top priority, and ask for Land, Water, and Conservation Fund (LWCF) appropriations from Congress.

1987, September – BLM completes the first New River ACEC management plan. The overriding goal of the plan is to provide protection and enhancement of the unique biological and cultural resources that exist on public lands.

1988 – The Division of State Lands and the Army Corps of Engineers become increasingly concerned about draining and ditching of wetlands in the New Lake area. Several warnings are issued to local ranchers regarding the filling of wetlands with ditch spoils.

1989 – BLM completes an Acquisition Plan for the New River ACEC. The plan identifies almost 3,700 acres of private and county lands for potential acquisition.

1989, December – BLM and The Nature Conservancy (TNC) enter into a Memorandum of Understanding in which TNC would assist in the acquisition of private lands and BLM would reimburse TNC at the approved appraised value as the BLM receives LWCF appropriations.

1990 – BLM receives $500,000 from LWCF for acquisitions at New River.

1991 – BLM receives an additional $1,000,000 from LWCF for acquisitions at New River.

1991, June – The Nature Conservancy acquires the 240-acre Storm Ranch and the 105-acre Hammond property along New River.

1991, June – BLM acquires the Storm Ranch and the Hammond property from TNC with appropriated LWCF.

1993 – A sharp increase in cranberry bog development is evident along Highway 101. Development increases in northern Curry and southern Coos counties near New River.

1993, March – The Snowy Plover, a species of concern to the US. Fish and Wildlife Service for the last ten years, is formally declared a threatened species. The beach north from Floras Lake to the mouth of New River, is one of the most important nesting sites for the species on the Oregon Coast.

1993, December – The acquisition plan for the New River ACEC is updated to reflect new market opportunities, changes in property value, and land exchange potentials.

1994 – The first western lily population is discovered at New River. The same year the western lily is listed as endangered under the federal Endangered Species Act.

1994, August – BLM acquires 111 acres at Floras Lake from the Scofield Corporation.

1994 – BLM begins scrutinizing water right applications in the New River basin due to concerns for water quality and quantity in New River. Approximately 70 new water right applications had been filed within the last four years in the New River area.

1994, December – BLM acquires the Lost Lake property from Helen Buck Russell. This property is the northeast most land to be acquired for the New River ACEC project.

1994, December – BLM is invited to participate in the State Water Resources Alternative Dispute Resolution process regarding water right applications in the New River basin.

1995, January – Rancher Mike Knapp receives an emergency permit for flood control from the Oregon Department of Lands to breach New River. This mechanical breach occurs at the southern-most part of New River at the sharp bend in Floras Creek.

1995, April – BLM acquires 25 acres along New River from Norman J. Paullus.

1995, May – BLM acquires 25 acres in Coos County and 54 acres in Curry County along New River from Stephan B. Kahn.

1997, Fall – Berry Botanic Garden plants 760 bulbs and seeds of western lily in an experimental plot at the New River ACEC as part of a recovery effort for this endangered species.

1998, Fall – BLM begins a coastal dune restoration project to remove European beach grass on the foredune west of New River. This project continues each fall, and by 2004, over 200 acres have been restored.

1999, January – The College of Oceanic & Atmospheric Sciences, Oregon State University, and Shoreland Solutions complete as study entitled, "A Study of the New River Spit, Oregon, to Acquire Information Relevant to an Adjustment of the Statutory Vegetation Line." The study addresses the spit's geomorphologic stability and that stability's relevance to encroaching vegetation.

2001, May – BLM dedicates the Learning Center at Storm Ranch in honor of Ellen Warring, a local resident who advocated for the protection of New River.

2002 – BLM completes an environmental assessment regarding livestock management issues along New River. As a result, BLM negotiates the canceling of all grazing allotments within the ACEC and establishes cooperative management agreements in their place. The result of the agreements is the exclusion of livestock grazing along the riparian zone of New River and Floras Lake outlet on both private and public lands. Four and a half miles of riparian fence is installed.

2003, July – A second, naturally occurring western lily population is discovered within the New River ACEC.

2003, September – Pacific Wind Power, LLC, proposes to build a large wind energy farm on the Knapp, Kamph, and Haga Ranches adjacent to New River. Curry County approves a permit to install three 180-foot high meteorological transmission towers to gather one year of data to determine if the area is feasible for such a facility.

2003 to 2004 – BLM completes an environmental assessment regarding the artificial breaching of New River and its impacts on the health of the ecosystem. The assessment determines that mechanical breaching on the southern end of New River leads to excessive sedimentation and drying of the river channel to the north. An alternative breach site is selected north of New Lake outlet on BLM land to provide adequate flood alleviation for the adjacent ranchers while improving the health of the river system. This breach site is mechanically opened in January 2004.

Appendix B
Hydrology of New River

A short description of the current river morphology and processes for New River follows by stream reach from south to north:

Reach 1. Floras Creek to Hanson Slough (river mile 8.5 to 9.5)

The river bed is up to 200 feet wide, straight, and very flat. There is very little riparian vegetation on the bed or banks. Repeated mechanical breaches in this reach have occurred over the years resulting in a low foredune height and loose sand banks. Winter overwashing is common. During 1964 and 1998, the river occasionally breached at the bend in Floras Creek from high runoff. Floodwaters bulk in this reach of river and are temporarily stored in the channel or out-of-bank. The landward side of the river is subject to wave erosion during the winter. A lack of riparian protection in this area has resulted in severe bank erosion.

Reach 2. Hanson Slough to clay island (river mile 7.3 to 8.5)

The river is shallow and narrower, ranging from 50 to 100 feet in width. New River is straight, on a very flat slope, and has some bank stabilization with riparian vegetation (mainly sedge species). The area north of Bono Ditch appears to have an underlying clay material that resists fluvial erosion resulting in a ridge or "high spot" in the river. This material is visible above ground at the northern end of this reach at a point where the river forks around a clay island. Channel drying may occur in this location in the summer. The foredune is higher along this reach of river and cannot be easily overtopped by sea conditions.

Reach 3. Clay island to New Lake outlet (river mile 5.3 to 7.3)

New River along this reach is narrower and meandering with deeper pools and undercut banks. Prolific riparian vegetation composed mainly of sedge species constrains the channel and provides some bank undercutting. The river is trending towards a C5/E5 river (Rosgen 1994). The foredune is relatively high.

Reach 4. New Lake outlet to Storm Ranch boat launch (river mile 3.4 to 5.3)

This reach is meandering with braided channels that lead to a wide, shallow area. Riparian vegetation is common on island braids. Salt and freshwater mix and is classified as inter-tidal. River banks are dominated with European beachgrass and shore pine on the east bank. European beach grass eradication has occurred on the foredune to restore the open sand dune community. This restoration work has created some shifting sands and overwash areas. Foredune height is relatively low.

Reach 5. Storm Ranch boat launch to ocean confluence (river mile 3.4 to 0.0)

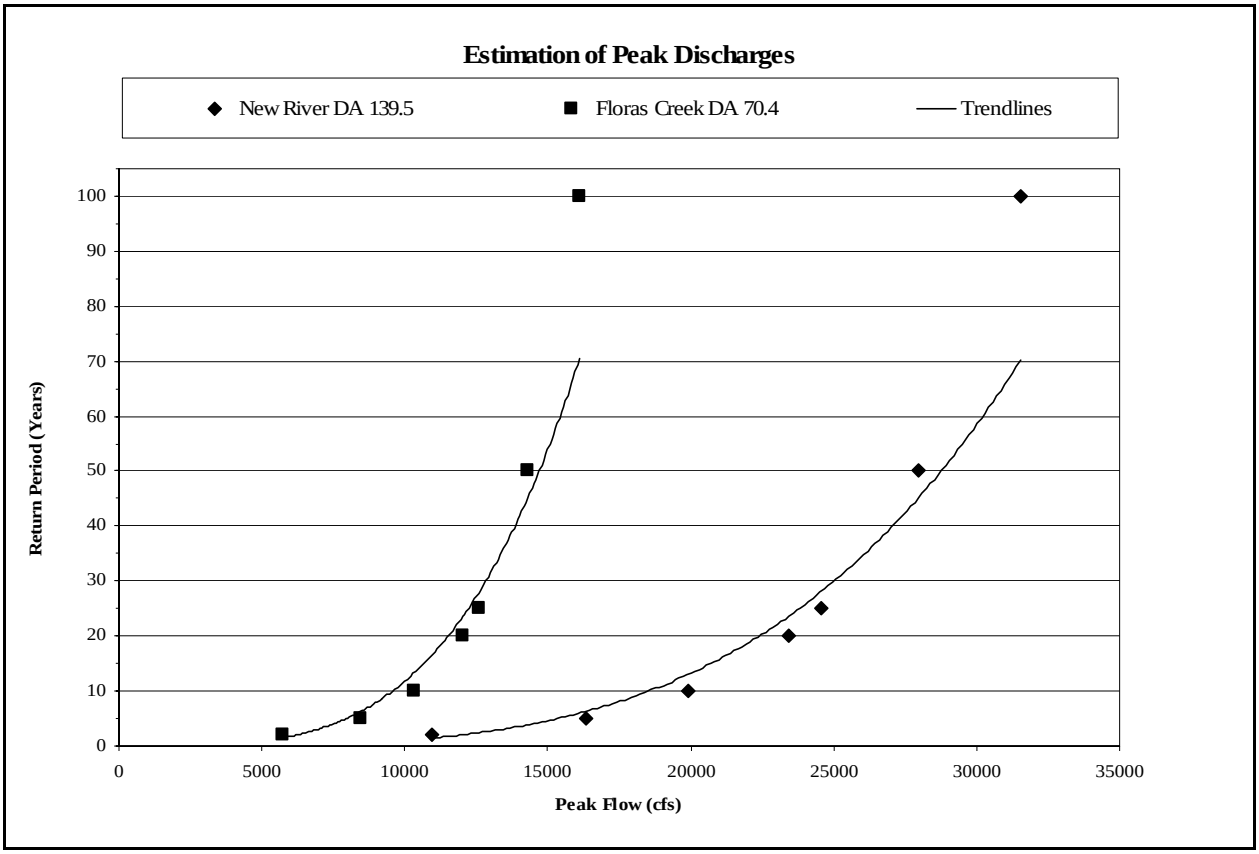
This reach is somewhat narrower. It is constrained by a clay formation along the east bank. There is free tidal exchange from the Pacific Ocean and the water is salty or estuarine, especially near the river mouth. To the north, New River meets south-flowing Twomile Creek and exits on a wide gently sloping dissipative beach. The mouth seems to be relatively stable between years, although it is slowly moving north. In the late summer when flows drop, movement of sand by constant winds (aeolian processes) closes the mouth. Freshwater then backs up in the river until a natural breach re-occurs, usually during an early winter storm.

Hydrodynamics

Winter precipitation patterns and watershed characteristics in this coastal area often result in flashy stream flows. Flows in New River vary according to the winter storm season and the point of flow accumulation (entering tributaries). Peak flow estimates in New River vary from 10,950 cubic feet per second (cfs) for a two year flood event (near bankfull flow) to 31,530 cfs for a 100-year flood event. These flow estimates do not account for losses to floodplain storage or losses through the river bed to the ocean.

Floras Creek provides the major contribution to the southern part of New River. Peak flow estimates range from 5,720 cfs for a two year flood event (near bankfull) to 16,100 cfs for a 100-year flood event. Figure 6 shows the difference in peak discharges between Floras Creek and New River based on the frequency of flood events (return period).

Figure 6. Estimation of Peak Discharges



When New River breaches in the northern portion of the river opposed to the southern end, a great deal of water can be detained in the system over time. A hydrologic analysis along the river in the area of Croft Lake, using channel geometry methods, suggests bankfull river flows are lower than predicted by other regional hydrologic flow estimation techniques (47 cfs per mi^2 compared with 78 cfs per mi^2). This supports the premise that a large amount of water is going into near-surface groundwater storage during high-flow periods.

Figure 7 illustrates stream flow durations for New River and Floras Creek. A stream flow that is equaled or exceeded 50% of the time is referred to as a '50% exceedance stream flow.' This ranges from 27 to 880 cfs for New River and 17 to 351 cfs for Floras Creek. These estimates do not account for groundwater storage or losses.

Figure 7. Stream Flow Duration

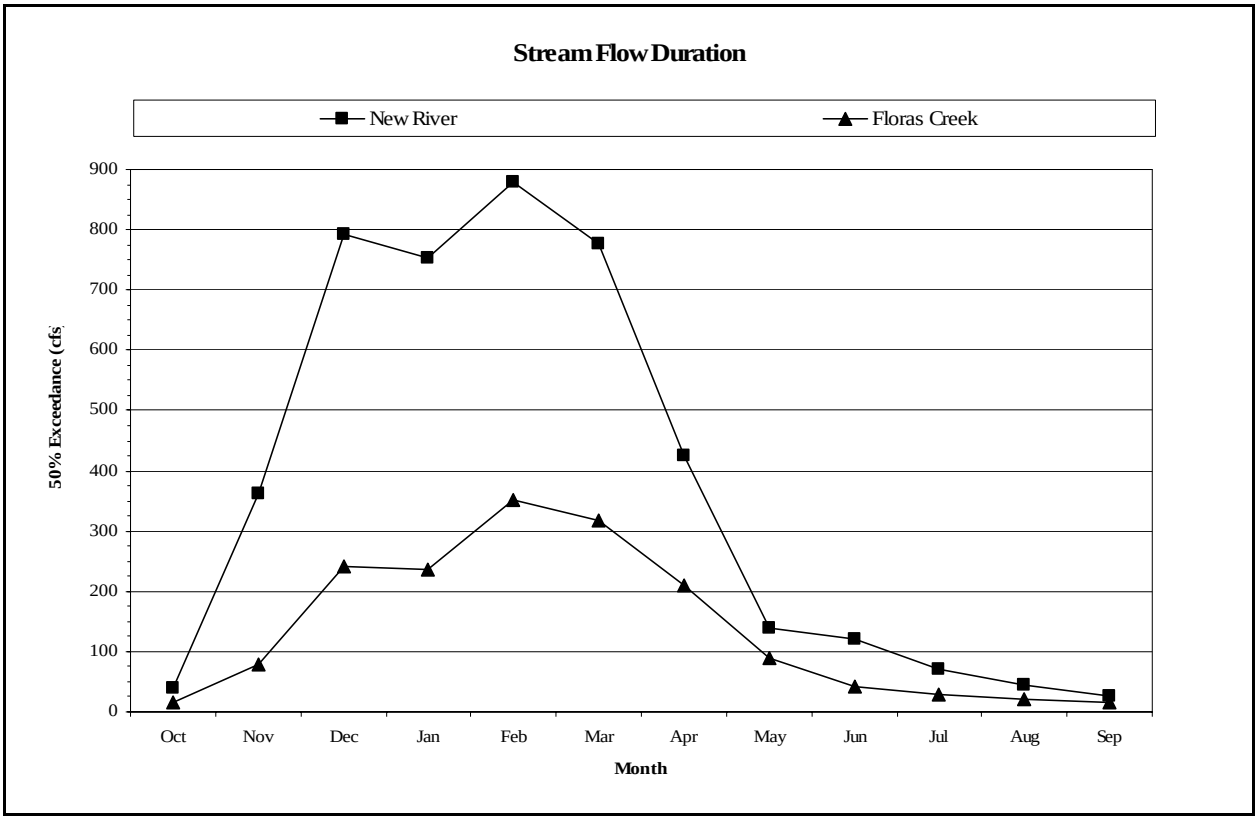
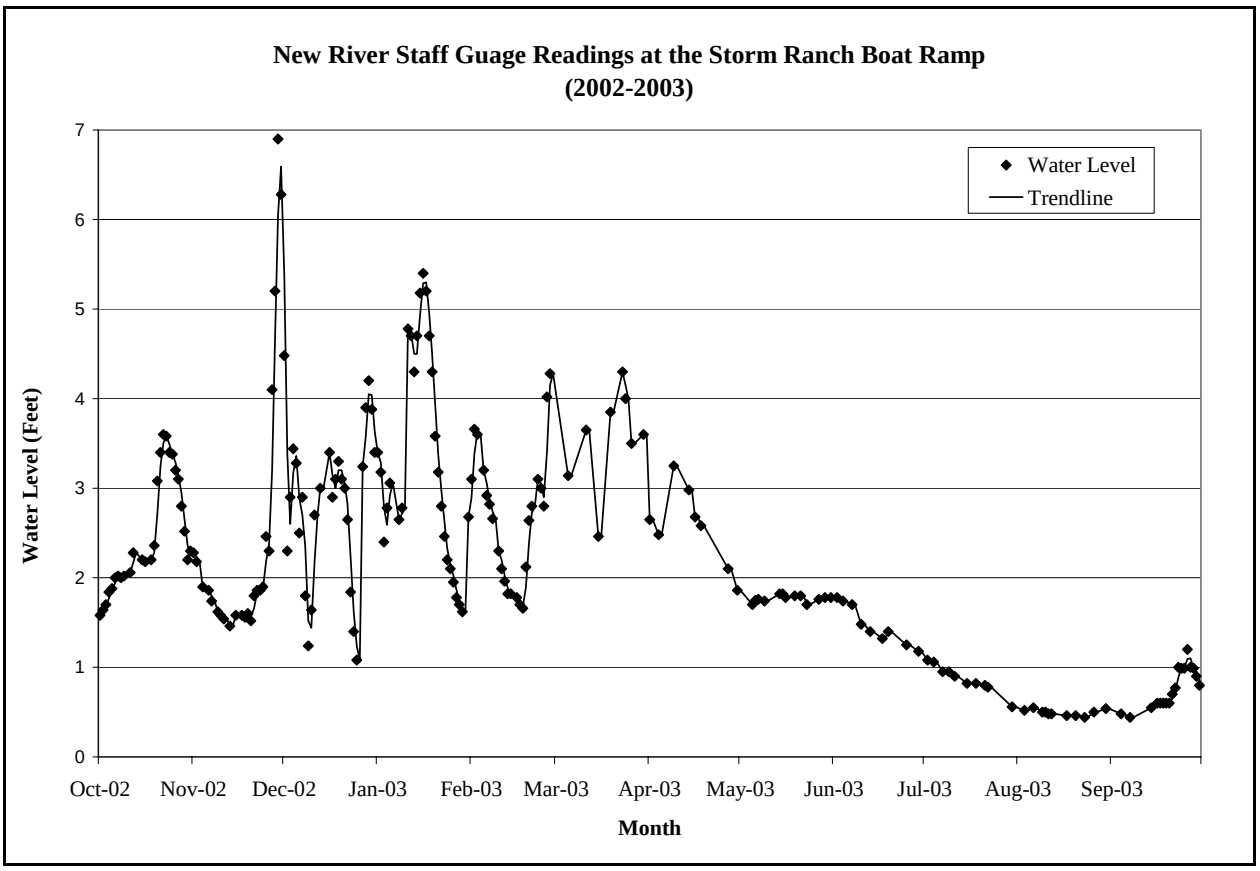


Figure 8 shows New River water levels from October 2002 through September 2003, based on staff gauge readings at the Storm Ranch boat launch. Although not correlated to discharge, the variability in water level and volume is apparent. Late summer to early fall rises in water level indicate the river mouth has closed off from the ocean due to wind-blown sands, which allows for greater storage of water in the system. A rapid decrease in water level in the late fall indicates that the river has breached across the closed mouth to the ocean.

Figure 8. New River Gauge Height Readings



Appendix C
Plant Communities and Species

Plant Communities in the New River Area

The following 22 plant communities of the New River Area were described by Christy (1981). Recent taxonomic changes to scientific names and have been made. Common names follow that of Kartesz (2003) and USDA, NRCS (2003).

1. *Ruppia maritima* (widgeongrass) stands. Aquatic, New River.
2. *Schoenoplectus americanus* (chairmaker's bulrush) mudflats. Edges of New River.
3. *Juncus* sp./*Deschampsia caespitosa/Orthocarpus ambigua* (rush/tufted hairgrass/Johnny-nip) stands. Low herb meadows.
4. *Nuphar polysepalum/Potomogeton natans* (yellow pond lily/floating pondweed) ponds. Aquatic.
5. *Darlingtonia california/Ledum glandulosum/Sphagnum subnitens* or *S. mendocinum* (California pitcherplant/glandular Labrador-tea/sphagnum moss). Mire.
6. *Carex obnupta/Argentina egedii ssp. egedii/Juncus leseuerii* (slough sedge/Pacific silverweed/salt rush). Dune slacks.
7. *Spiraea douglasii/Vaccinium uliginosum/Sphagnum mendocinum* (Douglas' meadow sweet/alpine blueberry/sphagnum moss). Dune slacks, seasonally wet.
8. *Deschampsia caespitosa* (tufted hairgrass) meadow. Seasonally wet.
9. *Alnus rhombifolia/Salix hookeriana/Spiraea douglasii/Carex obnupta* (white alder/coastal willow/Douglas' meadow sweet/slough sedge). Riparian woods.
10. *Pinus contorta/Gaultheria shallon/Carex obnupta* (shore pine/salal/slough sedge). Wet dune swales.
11. *Picea sitchensis* (Sitka spruce) forest. Successional climax.
12. Herb meadow, moist to dry.
13. *Juncus 1eseuerii/Eurhynchium oreganum* (salt rush/ Oregon eurhynchium moss). Dunes swales, early successional, wet phase.
14. *Abronia latifolia/Glehnia littoralis* ssp. *leiocarpa/Cakile edentula* (yellow sand-verbena/American silvertop/American searocket). Primary dune succession.
15. *Ammophila arenaria* (European beach grass) and scant forbs, on stabilizing sand. Early successional.
16. *Juncus leseuerii* (salt rush)/weeds on disturbed sand flats.
17. *Ammophila arenaria/Pinus contorta/Baccharis pilularis* (European beach grass/shore pine/coyotebrush) stabilized sand dunes, early-mid successional.
18. *Pinus contorta/Gaultheria shallon/Vaccinium ovatum* (shore pine/salal/evergreen blueberry) woodland. Canopy moderately open to closed.
19. Dry weedy meadow.
20. *Arctostaphylos uva-ursi* (red barberry) heath.
21. *Pinus contorta* (shore pine) scrub, sometimes cutover, on stabilized sand dunes. Probably a fire climax.
22. Cultivated *Vaccinium macrocarpon* (large cranberry) bogs (presently abandoned).

Plant Species in the New River Area

The plant species list for the New River Area was drawn from many sources (Christy 1981, Zika et al. 1998, BLM 1995b, Coos Bay District Nonvascular Herbarium database, and botany staff survey lists on file at the Coos Bay District). This list includes those documented as well as those suspected to occur. Common names follow that of Kartesz (2003) and the National Plants Database (USDA, NRCS 2003).

Note: * = special status plant species, E = exotic plant, and ncn = no common name.

NON-VASCULAR PLANTS

(lichens, sac fungi, club fungi, liverworts, hornworts, and mosses)

KINGDOM FUNGI

CLASS ASCOMYCETES & DISCOMYCETES (Lichens)
Alectoria imshaugii (Imshaug's witch's hair lichen)
Baeomyces rufus (brown-beret lichen)
Bryoria fuscescens (horsehair lichen)
**Bryoria pseudocapillaris* (horsehair lichen)
**Bryoria spiralifera* (horsehair lichen)
Cavernularia hultenii (Hulten's pitted lichen)
Cavernularia lophyrea (pitted lichen)
Cladina portentosa (reindeer lichen)
Cladina protentosa ssp. *pacifica* (reindeer lichen)
Cladonia cervicornis (cup lichen)
Cladonia chlorophaea (cup lichen)
Cladonia cornuta (cup lichen)
Cladonia furcata (cup lichen)
Cladonia ochrochlora (cup lichen)
Cladonia scabriuscula (cup lichen)
Cladonia subsquamosa (cup lichen)
Cladonia trascendens (transcend cup lichen)
Cladonia umbricola (cup lichen)
Cliostomum griffithii (ncn)
Erioderma sorediatum (ncn)
Graphis sp. (script lichen)
**Heterodermia leucomelos* (shield lichen)
Hypogymnia apinnata (tube lichen)
Hypogymnia enteromorpha (tube lichen)
Hypogymnia heterophylla (tube lichen)
Hypogymnia physodes (tube lichen)
Kaernefeltia californica (=*Centraria californica*, ncn)
**Leioderma sorediatum* (ncn)
Leptogium corniculatum (skin lichen)
Lobaria pulmonaria (lung lichen)
Menegazzia terebrata (honeycomb lichen)
Myloblastus sanguinarius (ncn)
Nephroma laevigatum (kidney lichen)
Nephroma resupinatum (kidney lichen)

**Niebla cephalota* (=*Vermilacinia cephalota*, ncn)
Ochrolechia subpallescens (crabseye lichen)
Parmelia squarrosa (shield lichen)
Parmelia sulcata (shield lichen)
Parmotrema arnoldii (ncn)
Parmotrema chinense (ncn)
Parmotrema crinitum (ncn)
Peltigera aphthosa (felt lichen)
Peltigera brittanica (British felt lichen)
Peltigera cf *polydactylon* (felt lichen)
Peltigera collina (felt lichen)
Peltigera membranacea (membranous felt lichen)
Peltigera ponojensis (felt lichen)
Platismatia herrei (Herre's ragged lichen)
Platismatia norvegica (Norwegian ragged lichen)
Pseudocyphellaria anthrapsis (ncn)
Pyrrhospora quernea (ncn)
Ramalina farinacea (farinose cartilage lichen)
Ramalina menziesii (Menzies' cartilage lichen)
Sphaerophorus globosus (globe ball lichen)
Sticta limbata (spotted felt lichen)
**Sulcaria badia* (ncn)
**Teloschistes flavicans* (ncn)
Tuckermannopsis chlorophylla (=*Cetraria chlorophylla*, ncn)
Tuckermannopsis orbata (=*Cetraria orbata*, ncn)
Usnea diplotypus (beard lichen)
Usnea filipendula (beard lichen)
Usnea substerilis (beard lichen)
Usnea wirthii (Wirth's beard lichen)

CLASS ASCOMYCOTINA (Sac Fungi)
Bisporella citrina (ncn)
Otidea leporina (rabbit's ears)

CLASS HYMENOMYCETES & GASTEROMYCETES (Club Fungi)
Agaricus sequoiae (ncn)
Amanita franchetii (yellow-veiled amanita)
Amanita gemmata (gemmed amanita)
Amanita muscaria (fly agaric, fly amanita)
Boletopsis subsquamosus group
Boletus edulis (king bolete, cep, steinpilz, porcini)
Calocera cornea (staghorn jelly fungus)
Cantharellus cibarius (chanterelle)
Chroogomphus vinicolor (pine spike)
Clavulina cinerea (ashy coral mushroom)
Clavulina cristata (ncn)
Clitopilius prunulus (sweatbread mushroom)
Coprinus comatus (shaggy mane)
Coprinus micaceus group (mica cap)
Cortinarius cotoneus (scaly cortinatius)
Cortinarius mucosus (ncn)

Cortinarius phoeniceus var. *occidentalis* (ncn)
Craterellus tubaeformis (yellow foot)
Cystoderma fallax (ncn)
Dermocybe cinnamonea group (ncn)
Dermocybe sanguineus (ncn)
Hydnellum scrobiculatum var. *zonatum* (bleeding tooth fungus)
Hygrocybe conica (witches' hat)
Hygrophoropsis aurantiaca (false chanterelle)
Hypholoma fasciculare (sulphur tuft)
Laccaria laccata (lackluster laccaria)
Lactarius deliciosus (milky cap)
Leccinum manzanitae (manzanita cap)
Leucoagaricus rubrotinctus (smooth parasol mushroom)
Lycoperdon perlatum (puffball)
Lyophyllum smitale group (ncn)
Mycena aurantiiomarsinata (ncn)
Mycena murina (yet another mycena)
Mycena pura (ncn)
Nolanea sp. (orange unicorn mushroom)
Phaeoleus schweinitzii (dyers polypore)
Phellodon melaleucus (ncn)
Rhizopogon occidentalis (ncn)
Rhodocollybia butyracea (buttery collybia)
Russula cremoricolor (creamy russula)
Russula fragilis (fragile russula)
Russula sanguinea (rosy russula)
Russula sororia (= *R. amoenolens*, comb russula)
Stereum sp. (false turkey tail)
Strobilurus trulisatus (ncn)
Strobilurus trullisatus (ncn)
Suillus brevipes (ncn)
Suillus granulatus (ncn)
Suillus occidentalis (ncn)
Suillus tomentosus (blue-staining slippery jack)
Suillus umbonatus (ncn)
Tricaptum abietinus (ncn)
Tricholoma flavovirens (man on horseback)
Tricholoma focale (armillaria focale)
Tricholoma magnivelare (matsutake)
Tricholoma sejunctum (ncn)
Tricholoma virgatum (ncn)
Xerocomus subtomentosus (boring brown bolete)

DIVISION BRYOPHYTA

CLASS HEPATICOPSIDE (Liverworts)
Calypogeia muelleriana (ncn)
**Calypogeia sphangnicola* (ncn)
Cephalozia bicuspidata ssp. *otaruensis* (ncn)
Cephalozia lunulifolia (ncn)
Cephaloziella divaricata (ncn)

Cephaloziella hampeana (ncn)
Fossombronia foveolata (ncn)
Frullania franciscana (ncn)
Frullania nisquallensis (ncn)
**Kurzia makinoana* (ncn)
Kurzia pauciflora (ncn)
Pellia epiphylla (ncn)
Porella navicularis (ncn)
Radula bolanderi (ncn)
Riccardia chamedryfolia (ncn)
Riccardia latifrons (ncn)

CLASS ANTHOCEROTOPSIDA (Hornworts)
None known at this time.

CLASS MUSCOPSIDA (Mosses)
Drepanocladus oxanolatus (drepanocladus moss)
Eurhynchium oreganum (Oregon eurhynchium moss)
Isothecium stoloniferum (isothecium moss)
Rhizomnium glabrescens (rhizomnium moss)
Sphagnum henryense (Henry's sphagnum moss)
Sphagnum mendocinum (Mendocino sphagnum moss)
Sphagnum subnitens (sphagnum moss)
**Triquetrella californica* (California triquetrella moss)

VASCULAR PLANTS

FERNS AND FERN ALLIES

DENNSTAEDTIACEAE (Bracken Family)
Pteridium aquilinum (northern bracken fern)

DRYOPTERIDACEAE (Wood Fern Family)
Athryium felix-femina (subacrctic lady fern)
Polystichum munitum (pinland sword fern)

BLECHNACEAE (Deer Fern Family)
Blechnum spicant (deer fern)

EQUISETACEAE (Horsetail Family)
Equisetum arvense (field horsetail)
Equisetum telmateia var. *braunii* (giant horsetail)
Equisetum fluviatile (water horsetail)

ISOETACEAE (Quillwort Family)
Isotes tenella (spiny-spore quillwort)

LYCOPODIACEAE (Club Moss Family)
**Lycopodiella inundata* (northern bog clubmoss)

OPHIGLOSSACEAE (Adder's-tongue Family)
Botrychium multifidum (leathery grapefern)

POLYPODIACEAE (Fern Family)
Polypodium glycyrrhiza (licorice fern)
Polypodium scouleri (leather polypody)

GYMNOPERMS

CUPRESSACEAE (Cypress Family)
Chamaecyparirts lawsoniana (Port-Orford-cedar)
Juniperus communis (common juniper)
Thuja plicata (western red cedar)

PINACEAE (Pine Family)
Abies grandis (grand fir)
Picea sitchensis (Sitka spruce)
Pinus contorta var. *contorta* (shore pine)
Pseudotsuga menziesii (Douglas-fir)
Tsuga heterophylla (western hemlock)

DICOTYLEDONS

APIACEAE (Parsley Family)
Angelica hendersonii (Henderson's angelica)
Cicuta douglasii (western water hemlock)
Daucus carota (Queen Anne's-lace) E
Daucus pusillus (American wild carrot)
Glehnia littoralis ssp. *leiocarpa* (American silvertop)
Heracleum maximum (American cow-parsnip)
Hydrocotyle ranunculoides (floating marsh-pennywort)
Hydrocotyle umbellata (many-flower marsh-pennywort)
**Hydrocotyle verticillata* (whorled marsh-pennywort)
Lilaeopsis occidentalis (western grasswort)
Oenanthe sarmentosa (Pacific water-dropwort)
Osmorhiza berteroi (sweetcicely)
Sanicula crassicaulis (Pacific blacksnakeroot)
Sanicula arctopoides (footsteps-of-spring)

AQUIFOLIACEAE (Holly Family)
Ilex aquifolium (English holly) E

ARACEAE (Arum Family)
Lysichiton americanus (yellow-skunk-cabbage)

ARALIACEAE (Ginseng Family)
Hedera helix (English ivy) E

ASTERACEAE (Sunflower Family)
Achillea millefolium (common yarrow)

Ambrosia chamissonis (silver burr ragweed) E
Anaphalis margaritacea (pearly-everlasting)
Anthemis cotula (stinking chamomile) E
Artemisia pycnocephala (beach wormwood)
Baccharis pilularis (coyotebrush)
Bellis perennis (lawndaisy) E
Cirsium arvense (Canadian thistle) E
Cirsium remotifolium ssp. *remotifolium* (fewleaf thistle)
Cirsium vulgare (bull thistle) E
Conzya canadensis (Canadian horseweed)
Corethrogyne filaginifolia var. *californica* (common sand aster)
Cotula coronopifolia (common brassbuttons) E
Crepis capillaries (smooth hawksbeard) E
Erechtites minima (coastal burweed) E
Erigeron glaucus (seaside fleabane)
Gamochaeta purpurea (spoon-leaf purple everlasting)
Gnaphalium uliginosum (marsh cudweed)
Grindelia stricta (Oregon gumweed)
Helenium bolanderi (coastal sneezeweed)
Hesperevax sparsiflora var. *brevifolia* (shortleaf dwarf-cudweed)
Hieracium albiflorum (white-flowered hawkweed)
Hypochaeris radicata (hairy cat's-ear) E
Leontodon taraxacoides ssp. *taraxacoides* (lesser hawkbit) E
Leucanthemm vulgare (oxeye daisy) E
Matricaria discoidea (pineapple-weed)
Micropus californicus (q tips)
Senecio jacobea (tansy ragwort) E
Senecio sylvaticus (woodland ragwort) E
Solidago canadensis var. *salebrosa* (Canada goldenrod)
Sonchus oleraceus (common sow thistle) E
Symphyotrichum chilense (Pacific American-aster)
Symphyotrichum subspicatum (Douglas aster)
Tanacetum camphoratum (camphor tansy) E
Taraxacum officinale (common dandelion) E

BERBERIDACEAE (Barberry Family)
Mahonia aquifolium (holly-leaf Oregon-grape)
Mahonia nervosa (Cascade Oregon-grape)

BETULACEAE (Birch Family)
Alnus rhombifolia (white alder)
Alnus rubra (red alder)
Corylus cornuta (beaked hazelnut)

BORAGINACEAE (Borage Family)
**Cryptantha leiocarpa* (seaside cryptantha)
Myosotis discolor (yellow scorpion-grass)
Myosotis laxa (bay forget-me-not)
Symphytum asperum (prickly comfrey) E

BRASSICACEAE (Mustard Family)

Brassica rapa var. *rapa* (rape) E
Cakile edentula (American searocket) E
Cakile maritima (European searocket) E
Capsella bursa-pastoris (shepherd's-purse) E
Cardamine occidentalis (big western bittercress)
Raphanus sativus (radish) E
Sisymbrium officinale (hedge-mustard)

CABOMBACEAE (Water-shield Family)
Brasenia schreberi (watershield)

CALLITRICHEACEAE (Water-starwort Family)
Callitriche hermaphroditica (autumn water-starwort)
Callitriche stagnalis (pond water-starwort)

CAPRIFOLIACEAE (Honeysuckle Family)
Lonicera hispidula (pink honeysuckle)
Lonicera involucrata (four-line honeysuckle or twinberry)

CARYOPHYLLACEAE (Pink Family)
Cardionema ramosissimum (sand carpet)
Cerastium arvense (field mouse-ear chickweed) E
Cerastium glomeratum (sticky chickweed) E
Lychnis coronaria (rose campion) E
Sagina decumbens ssp. *occidentalis* (western pearlwort)
Silene gallica (windmill-pink) E
Silene scouleri (simple catchfly)
Spergularia rubra (red sand spurry) E
Stellaria calycantha (northern starwort)

CERATOPHYLLACEAE (Hornwort Family)
Ceratophyllum demersum (coon's tail)

CHENOPODIACEAE (Goosefoot Family)
**Atriplex leucophylla* (beach saltbush)
Atriplex patula (halberd-leaf orache)
Chenopodum ambroisioides (Mexican-tea) E

CLUSIACEAE (Mangosteen Family)
Hypericum anagalioides (tinker's penny)
Hypericum boreale (northern St. John's wort)
Hypericum X *moserianum* (gold flower)

CONVOLVULACEAE (Morning-glory Family)
Calystegia soldanella (seashore false bindweed)

CUSCUTACEAE (Dodder Family)
Cuscuta salina var. *major* (goldenthread)

DROSERACEAE (Sundew Family)
Drosera rotundifolia (round-leaf sundew)

EMPETRACEAE (Crowberry Family)
Empetrum nigrum (black crowberry)

ERICACEAE (Heath Family)
Arbutus menziesii (Pacific madrone)
Arctostaphylos columbiana (bristly manzanita)
Arctostaphylos glandulosa (Eastwood's manzanita)
Arctostaphylos patula (green-leaf manzanita)
Arctostaphylos uva-ursi (red barberry)
Arctostaphylos X *parviflora* (pro sp.)
Gaultheria shallon (salal)
Ledum glandulosum (glandular Labrador-tea)
Rhododendron macrophyllum (California rhododendron)
Rhododendron occidentale (western azalea)
Vaccinim uliginosum (alpine blueberry)
Vaccinium macrocarpon (large cranberry)
Vaccinium ovatum (evergreen blueberry)
Vaccinium parvifolium (red blueberry)

FABACEAE (Pea Family)
Acacia dealbata (silver wattle) E
Cytisus scoparius (Scotch broom) E
Genista monspessulana (French broom) E
Lathryus latifolius (everlasting pea) E
Lathyrus japonicus (sea vetchling)
Lotus corniculatus (garden bird's-foot-trefoil)
Lotus formosissimus (seaside bird's-foot-trefoil)
Lotus unifoliolatus var. *unifoliolatus* (American bird's-foot-trefoil)
Lupinus littorallis (Chinook lupine)
Melilotus officinalis (yellow sweet-clover)
Trifolium dubium (suckling clover) E
Trifolium repens (white clover) E
Trifolium wormskjoldii (cows clover)
Ulex europaeus (common gorse) E
Vicia nigricans ssp. *gigantea* (black vetch)
Vicia sativa (garden vetch)

FUMARIACEAE (Fumitory Family)
Dicentra formosa (Pacific bleeding heart)

GARRYACEAE (Silk-tassel Family)
Garrya elliptica (wavy-leaf sikltassel)

GENTIANACEAE (Gentian Family)
Centaurium erythraea (European centaury) E
**Cicendia quadrangularis* (Oregon timwort)
Gentiana sceptrum (king's-scepter gentian)

GERANIACEAE (Geranium Family)
Erodium cicutarium (red-stem stork's-bill) E

Geranium dissectum (cut-leaf crane's-bill) E

GROSSULARIACEAE (Currant Family)
Ribes sanguineum (blood currant)

HYDROPHYLLACEAE (Waterleaf Family)
**Phacelia argentea* (silvery phacelia, sand-dune scorpion weed)

LAMIACEAE (Mint Family)
Clinopodium douglasii (yerba buena)
Lamium purpureum (red henbit)
Mentha arvensis (wild mind)
Mentha pulegium (pennyroyal) E
Prunella vulgaris (common selfheal)

LAURACEAE (Laurel Family)
Umbellularia californica (California-laurel or myrtlewood)

LENTIBULARIACEAE (Bladder-wort Family)
**Utricularia gibba* (humped bladderwort)
Utricularia macrorhiza (greater bladderwort)

LINACEAE (Flax Family)
Linum bienne (pale flax) E

MENYANTHACEAE (Buckbean Family)
Menyanthes trifoliata (buck-bean)

MYRICACEAE (Sweet Gale Family)
Morella californica (Pacific bayberry)

NYCTAGINACEAE (Four-O'clock Family)
**Abronia latifolia* (yellow sand-verbena)
**Abronia umbellata var. breviflora* (pink sand-verbena)

NYMPHAEACEAE (Water-lily Family)
Nuphar lutea ssp. *polysepala* (yellow pond-lily)

ONAGRACEAE (Evening-primrose Family)
Camissonia cheiranthifolia (beach suncup)
Epilobium ciliatum ssp. *watsonii* (fringed willowherb)
Oenothera glazioviana (red-sepal evening-primrose) E

OROBANCHEACEAE (Broom-rape Family)
Boschniakia strobilacea (California groundcone)
Boschniakia hookeri (Vancouver groundcone)

PAPAVERACEAE (Poppy Family)
Platystemon californicus (California creamcups)

PLANTAGINACEAE (Plantain Family)

Plantago coronopus (buckhorn plantain) E
Plantago erecta (dotseed plantain)
Plantago lanceolata (English plantain) E
Plantago major (great plantain) E
Plantago maritima var. *juncoides* (goosetongue)
Plantago subnuda (tall coastal plantain)

PLUMBAGINACEAE (Leadwort Family)
Armeria maritima ssp. *californica* (sea thrift)

POLEMONIACEAE (Phlox Family)
Gilia capitata (blue-head gily-flower)
**Gilia millefoliata* (seaside gilia)
Linanthus bicolor (desert-trumpets)
Navarretia squarrosa (skunk weed)

POLYGONACEAE (Buckwheat Family)
Polygonum hydropiperoides (swamp smartweed)
Polygonum paronchyia (beach knotweed)
Rumex acetosella (common sheep sorrel) E
Rumex aquaticus var. *fenustratus* (western dock)
Rumex conglomeratus (clustered dock) E
Rumex crispus (curly dock) E
Rumex maritimus (golden dock) E
Rumex salicifolius (willow dock)

PORTULACEAE (Purslane Family)
Calandrinia ciliata (fringed redmaids)
Claytonia exigua ssp. *exigua* (serpentine springbeauty)
Claytonia sibirica var. *sibirica* (Siberian springbeauty)

POTOMOGETONACEAE (Pondweed Family)
Potamogeton epihydrus (ribbonleaf pondweed)
Potamogeton pusillus ssp. *tenuissimus* (small pondweed)
Potomogeton natans (floating pondweed)
Potomogeton richardsonii (red-head pondweed)
Stuckenia pectinatus (sago pondweed)

PRIMULACEAE (Primrose Family)
Anagallis minima (chaffweed)
Lysimachia terrestris (swamp candles)
Trientalis borealis ssp. *latifolia* (maystar)
Trientalis europea ssp. *arctica* (Arctic starflower)

RANUNCULACEAE (Buttercup Family)
Ranunculus flammula (greater creeping spearwort)
Ranunculus repens (creeping buttercup) E
Ranunculus uncinatus (woodland buttercup)

RHAMNACEAE (Buckthom Family)
Frangula purshiana (Cascara false buckthorn)

ROSACEAE (Rose Family)
Amelanchier alnifolia (Saskatoon service-berry)
Argentina anserina (silverweed cinquefoil)
Argentina egedii ssp. egedii (Pacific silverweed)
Chaenomeles speciosa (flowering quince, horticultural introduction)
Comarum palustre (purple marshlocks)
Frageria chiloensis (beach strawberry)
Holodiscus discolor (hillside oceanspray)
Malus fusca (Oregon crabapple)
Malus sp. (apple, horticultural introduction)
Rubus armeniacus (Himalayan blackberry) E
Rubus leucodermis (whitebark raspberry)
Rubus parviflorus (western thimble-berry)
Rubus spectabilis (salmon raspberry)
Rubus ursinus (California dewberry)
Sanguisorba officinalis (great burnet)
Spiraea douglasii (Douglas' meadow sweet)

RUBIACEAE (Madder Family)
Galium aparine (sticky-willy)
Galium trifidum ssp. *pacificum* (three-petal bedstraw)
Galium triflorum (fragrant bedstraw)

RUPPIACEAE (Ditch-grass Family)
Ruppia maritima (widgeongrass)

SALICACEAE (Willow Family)
Salix hookeriana (coastal willow)
Salix lucida ssp. *lasiandra* (shining willow)
Salix sitchensis (Sitka willow)

SARRACENIACEAE (Pitcher-plant Family)
**Darlingtonia californica* (cobraplant, California pitcher-plant)

SCROPHULARIACEAE (Figwort Family)
Castilleja affinis ssp. *litoralis* (coast Indian paintbrush)
Digitalis purpurea (purple foxglove) E
Gratiola ebracteata (bractless hedgehyssop)
Orthocarpus ambigua ssp. *ambigua* (Johnny-nip)
Parentucellia viscosa (yellow glandweed) E
Synthris reniformis (snowqueen)
Triphysaria eriantha ssp. *eriantha* (Johnny-tuck)
Veronica scutellata (grass-leaf speedwell)

TAXODIACEAE (Bald Cypress Family)
Sequoia sempervirens (coast redwood) [horticultural introduction]

VIOLACEAE (Violet Family)
Viola lanceolata ssp. *lanceolata* (bog white violet)
Viola macloskeyi ssp. *pallens* (smooth white violet)

Viola sempervirens (redwood violet)

MONOCOTYLEDONS

CYPERACEAE (Sedge Family)
Carex aquatilis var. *dives* (Sitka sedge)
Carex brevicaulis (shortstem sedge)
Carex cusickii (Cusick's sedge)
Carex echinata ssp. *phyllomanica* (starsedge)
Carex leptopoda (taperfruit short scale sedge)
Carex lyngbyei (Lyngbye's sedge)
Carex macrocephala (big-head sedge)
Carex obnupta (slough sedge)
Carex pachystachya (chamisso sedge)
Carex pansa (sand-dune sedge)
Carex viridula (little green sedge)
Dulichium arundinaceum (three-way sedge)
Eleocharis acicularis (needle spike-rush)
Eleocharis macrostachya (pale spike-rush)
**Eriophorum chamissonis* (russet cotton-grass)
Isolepis cernua (low bulrush)
Schoenoplectus acutus var. acutus (hardstem bulrush)
Schoenoplectus americanus (chairmaker's bulrush)
**Schoenoplectus subterminalis* (=*Scirpus subterminalis*, water clubrush)
Schoenoplectus tabermaemontani (sofstem bulrush)

HYDROCHARITACEAE (Tape-grass Family)
Egeria densa (Brazilian waterweed) E

IRIDACEAE (Iris Family)
Crocosmia X *crocosmiiflora* (montbretia) E
Iris douglasiana (Mountain iris)
Sisyrinchium bellum (California blue-eyed-grass)
Sisyrinchium californicum (golden blue-eyed-grass)

JUNCACEAE (Rush Family)
Juncus articulatus (jointleaf rush)
Juncus bufonis (toad rush)
Juncus canadensis (Canadian rush)
Juncus effuses (lamp rush)
Juncus ensifolius (swordleaf rush)
Juncus falcatus (sickle-leaf rush)
Juncus leseuerii (salt rush)
Juncus nevadensis (Sierra rush)
Juncus orthophyllus (straightleaf rush)
Juncus planifolius (broadleaf rush)
Juncus supiniformis (hairlyleaf rush)
Luzula comosa (Pacific wood-rush)
Luzula parviflora (small-flower wood-rush)

LEMNACEAE (Duckweed Family)

Lemna minor (common duckweed)

LILIACEAE (Lily Family)
**Brodia terrestris* (dwarf brodiaea)
Calochortus tolmiei (cat's-ears)
Disporum hookeri var. *hookeri* (drops of gold)
Lilium columbianum (Columbian lily)
**Lilium occidentale* (Eureka lily, western lily)
Maianthemum dilatatum (two-leaf false Solomon's seal)
Maianthemum stellatum (starry false lily of the valley)
Tofieldia glutinosa ssp. *glutinosa* (sticky tofieldia)
Trillium ovatum (western wakerobin)
Zigadenus fremontii (Fremont's deathcamus)

ORCHIDACEAE (Orchid Family)
Goodyera oblongifolia (green-leaf rattlesnake-plantain)
Piperia elegans ssp. *elegans* (elegant piperia)
Spiranthes romanzofiana (hooded ladies'-tresses)

POACEAE (Grass Family)
Agrostis capillaris (colonial bent)
Agrostis exarata (spiked bent)
Agrostis stolonifera (spreading bent) E
Aira caryophylla (common silver-hair grass) E
Aira praecox (early silver-hair grass)
Alopecurus geniciulatus (water foxtail)
Ammophila arenaria (European beach grass) E
Anthoxanthum odoratum (sweet vernal grass) E
Briza maxima (greater quaking grass) E
Briza minor (little quakinggrass) E
Bromus carinatus (California brome)
Bromus diandrus (great brome) E
Bromus hordeaceus (soft brome) E
Bromus vulgaris (Columbia brome)
Calamagrostis nutkaensis (Nootka reed grass)
Cortaderia jubata (purple pampas grass) E
Cynosurus cristatus (crested dogstail grass) E
Cynosurus echinatus (bristly dog's-tail grass) E
Danthonia californica (California wild oat grass)
Danthonia decumbens (common heathgrass) E
Deschampsis caespitosa (tufted hairgrass)
Dichanthelium acuminatum var. *fasciculatum* (western panicgrass)
Distichilis spicata (coastal salt grass)
Echinochloa crus-galli (barnyardgrass) E
Festuca occidentalis (western fescue)
Festuca rubra ssp. *mediana* (red fescue)
Festuca subuliflora (crinkle-awn fescue)
Glyceria striata (fowl manna-grass)
Hierochloe occidentalis (California sweetgrass)
Holcus lanatus (common velvet grass) E
Koeleria macrantha (prairie Koeler's grass)

Leymus mollis (American lyme grass)
Lolium arundinaceum (tall fescue) E
Lolium perenne ssp. *multiflorum* (Italian ryegrass) E
Melica geyeri var. *aristulata* (Geyer's oniongrass)
Melica subulata (Alaska oniongrass)
Phalaris arundinacea (reed canary grass) E
Poa annua (annual bluegrass)
Poa confinis (coastline bluegrass)
Poa macrantha (sand-dune blue grass)
Trisetum canescens (tall trisetum)
Vulpia bromoides (brome fescue) E

SPARGANIACEAE (Bur-reed Family)
Sparganium emersum (European burr-reed)

TYPHACEAE (Cat-tail Family)
Typha latifolia (broad-leaf cat-tail)

Appendix D
Wildlife Species

Wildlife inventories are incomplete for the New River area, except for the bird list. Bird observations were compiled by Tim Rodenkirk, BLM Natural Resource Specialist. See Contreras (1998) for more information on the status and distribution of birds in Coos County, Oregon.

Birds

Status:
B – breeding species
M – migrant (usually May-June and August-October)
MS – spring migrant only (usually present May-June)
MF – fall migrant only (usually present August-October)
PB – post breeding migrant (typically present summer-fall)
W – wintering species (normally present in Oct/Nov-April/May)
Y – Year-round resident
O – offshore species occasionally seen from land

Abundance:
C – common to abundant, easily observed in appropriate habitat
FC – fairly common, usually observed in appropriate habitat
U – uncommon, not always observed in appropriate habitat
R – rare, not seen every year
V – vagrant, very rare species with few records
I – irregular, numbers fluctuate year-to-year

Note: * = Probable breeders, (?) = Status is probable, but undocumented

SWANS/GEESE/DUCKS (Family Anatidae)
Tundra Swan (*Cygnus columbianus)* W-U
Greater White-fronted Goose (*Anser albifrons)* MF-U, MS-R
Snow Goose (*Chen caerulescens*) M-R
*Canada Goose (*Branta Canadensis)* Y-C
Aleutian Canada Goose (*Branta canadensis leucopareia)* M-C
Brant *(Branta bernicula*) M-U
*Wood Duck *(Aix sponsa)* B-U, W-R (?)
American Wigeon *(Anas americana)* W-C
Eurasian Wigeon (*Anas penelope)* W-R
Green-winged Teal *(Anas crecca)* W-C
*Mallard *(Anas platyrhynchos*) Y-C
Gadwall *(Anas strepera*) W-FC
Northern Shoveler (*Anas clypeata)* W-FC
Northern Pintail *(Anas acuta*) W-C
Cinnamon Teal *(Anas cyanoptera)* M-U
Blue-winged Teal (*Anas discors)* M-U
Canvasback (*Aythya valisineria)* W-FC
Redhead *(Aythya Americana)* M-U

Ring-necked Duck (*Aythya collaris)* W-C
Greater Scaup *(Aythya marila)* W-C
Lesser Scaup *(Aythya affinis*) W-FC
Long-tailed Duck (*Clangula hyemalis)* W-R
Black Scoter *(Melanitta nigra)* W-U
Surf Scoter *(Melanitta perspicillata)* W-C
White-winged Scoter *(Melanitta fusca)* W-U
Bufflehead *(Bucephala albeola)* W-C
Red-breasted Merganser *(Mergus serrator)* W-FC
Common Merganser *(Mergus merganser)* Y-U
Hooded Merganser *(Lophodytes cucullatus)* W-U
Ruddy Duck *(Oxyura jamaicensis)* W-U

PHEASANT (Family Phasianidae)
*Ring-necked Pheasant *(Phasianus colchicus)* Y-R, B-R (?)

QUAIL (Family Odontophoridae)
*Mountain Quail *(Oreortyx pictus)* B-R (?)
*California Quail *(Callipepla californica)* Y-U

LOONS (Family Gaviidae)
Common Loon *(Gavia immer)* W-C
Pacific Loon *(Gavia pacifica)* O, M-C, W-U
Red-throated Loon *(Gavia stellata)* O, M-FC, W-U

GREBES (Family Podicipedidae)
*Pied-billed Grebe *(Podilymbus podiceps)* Y-FC
Red-necked Grebe *(Podiceps grisegena)* W-U
Horned Grebe *(Podiceps auritus)* W-FC
Eared Grebe *(Podiceps nigricollis)* W-R
Western Grebe *(Aechmophorus occidentalis)* W-C
Clark's Grebe *(Aechmophorus clarkii)* W-R

SHEARWATERS (Family Procellariidae)
Northern Fulmar *(Fulmarus glacialis)* O, MF-U, W-U
Sooty Shearwater (*Puffinus griseus)* O, MF-C, W-R

PELICANS (Family Pelecanidae)
Brown Pelican (*Pelecanus occidentalis)* PB-FC
American White Pelican *(Pelecanus erythrorhynchos)* V

CORMORANTS (Family Phalacrocoracidae)
*Double-crested Cormorant *(Phalacrocorax auritus)* Y-FC
Pelagic Cormorant (*Phalacrocorax pelagicus)* O, Y-U
Brandt's Cormorant (*Phalacrocorax penicillatus)* O, Y-U

HERONS (Family Ardeidae)
*American Bittern *(Botaurus lentiginosus)* B-R
*Great Blue Heron *(Ardea herodias)* Y-FC
Great Egret *(Casmerodius albus)* M-U, W-U

VULTURES (Family Cathartidae)
*Turkey Vulture *(Cathartes aura)* B-FC

KITES/HAWKS/EAGLES (Family Accipitridae)
*White-tailed Kite *(Elanus caeruleus)* W-U, B-R (?)
Bald Eagle *(Haliaeetus leucocephalus*) Y-U
Golden Eagle *(Aquilia chrysaetos)* Y-R
*Northern Harrier *(Circus cyaneus*) W-C, B-R (?)
*Sharp-shinned Hawk *(Accipiter striatus*) Y-U
*Cooper's Hawk *(Accipiter cooperii*) Y-U
*Red-tailed Hawk *(Buteo jamaicensis*) Y-U
*Red-shouldered Hawk *(Buteo lineatus)* Y-U
*Osprey *(Pandion haliaetus)* B-FC, W-R

FALCONS (Family Falconidae)
American Kestrel *(Falco sparverius)* M-U
Merlin *(Falco columbarius)* W-U
Peregrine Falcon *(Falco peregrinus)* Y-U
Gyrfalcon *(Falco rusticolus)* V

RAIL/COOT (Family Rallidae)
*Virginia Rail *(Rallus limicola)* B-U
*Sora *(Porzana carolina)* B-R (?)
American Coot *(Fulica americana)* W-FC

PLOVERS (Family Charadriidae)
Black-bellied Plover *(Pluvialis squatarola)* M-C, W-R
Pacific Golden-plover *(Pluvialis fulva)* MF-U, MS-R
American Golden-plover *(Pluvialis dominica)* MF-U, MS-R
Semipalmated Plover *(Charadrius semipalmatus*) M-C, W-R
*Western Snowy Plover *(Charadrius alexandrinus nivosus)* Y-U
*Killdeer *(Charadrius vociferus)* Y-FC

OYSTERCATCHER (Family Haematopodidae)
Black Oystercatcher *(Haematopus bachmani)* M-R

STILTS/AVOCETS (Family Recurvirostridae)
Black-necked Stilt *(Himantopus mexicanus)* V
American Avocet *(Recurvirostra americana)* V

SANDPIPERS (Family Scolopacidae)
Greater Yellowlegs *(Tringa melanoleuca)* M-C
Lesser Yellowlegs *(Tringa flavipes)* M-U
*Spotted Sandpiper *(Actitus macularia*) B-FC
Willet (*Catoptrophorus semipalmatus)* M-U
Whimbrel *(Numenius phaeopus)* M-C
Bristle-thighed Curlew *(Numenius tahitiensis)* V
Long-billed Curlew *(Numenius americanus)* M-U
Marbled Godwit *(Limosa fedoa)* M-U
Ruddy Turnstone *(Arenaria inter)* M-U
Black Turnstone *(Arenaria interpres)* M-U

Sanderling *(Calidris alba)* W-C
Surfbird *(Aphriza virgata)* M-U
Red Knot (*Calidris canutus)* M-U
Semipalmated Sandpiper *(Calidris pusilla)* M-R
Western Sandpiper *(Calidris mauri)* M-C, W-R
Least Sandpiper *(Calidris minutilla)* M-C, W-U
Long-toed Stint *(Calidris subminuta)* V
White-rumped Sandpiper *(Calidris fuscicollis)* V
Baird's Sandpiper *(Calidris bairdii)* M-U
Pectoral Sandpiper *(Calidris melanotos)* M-FC
Sharp-tailed Sandpiper *(Calidris acuminata)* V
Dunlin *(Calidris alpina)* M-C, W-U
Stilt Sandpiper *(Calidris himantopus)* M-R
Buff-breasted Sandpiper *(Tryngites subruficollis)* M-R
Ruff *(Philomachus pugnax)* M-R
Upland Sandpiper *(Bartramia longicauda)* V
Short-billed Dowitcher *(Limnodromus griseus)* M-C
Long-billed Dowitcher *(Limnodromus scolopaceus)* M-C, W-R
Wilson's Snipe *(Gallinago delicata)* W-FC
Red-necked Phalarope *(Phalaropus lobatus)* M-U
Red Phalarope *(Phalaropus fulicaria)* O, M-U, W-R

GULLS/TERNS (Family Laridae)
California Gull *(Larus californicus)* PB-C, W-U
*Western Gull *(Larus occidentalis)* Y-C
Glaucous-winged Gull *(Larus glaucescens)* W-C
Glaucous Gull *(Larus hyperboreus)* W-R
Herring Gull *(Larus argentatus*) M-FC, W-U
Thayer's Gull *(Larus thayeri)* W-U
Bonaparte's Gull *(Larus philadelphia)* M-FC, W-I
Franklin's Gull *(Larus pipixcan)* V
Heermann's Gull *(Larus heermanni*) PB-FC
Mew Gull *(Larus canus)* W-C
Ring-billed Gull *(Larus delawarensis)* W-U
Black-legged Kittiwake *(Rissa tridactyla)* O, W-U
Elegant Tern *(Sterna elegans)* PB-R
Caspian Tern *(Sterna caspia)* M-C

AUKS (Family Alcidae)
Pigeon Guillemot *(Cepphus columba)* O, M-U
Common Murre *(Uria aalge)* O: Y-FC, W-U
Marbled Murrelet *(Brachyramphus marmoratus)* O, Y-R
Rhinoceros Auklet *(Cerorhinca monocerata)* O, M-U

PIGEONS/DOVES (Family Columbidae)
Rock Pigeon *(Columba livia)* Y-R
Band-tailed Pigeon *(Columba fasciata)* M-U
*Mourning Dove *(Zenaida macroura)* B-C

OWLS (Family Tytonidae)
Barn Owl *(Tyto alba)* Y-R

OWLS (Family Strigidae)
*Great-horned Owl *(Bubo virginianus)* Y-U
*Northern Pygmy Owl *(Glaucidium gnoma)* B-R (?)
*Western Screech-Owl (*Otus kennicottii)* Y-R (?)
Burrowing Owl (*Athene cunicularia*) M-R, W-R

NIGHTJARS (Family Caprimulgidae)
*Common Nighthawk *(Chordeiles minor)* B-U
Common Poorwill *(Phalaenoptilus nuttalli*) V

SWIFTS (Family Apodidae)
Black Swift *(Cypseloides niger)* M-U
*Vaux's Swift *(Chaetura vauxi)* M-C, B-U

HUMMINGBIRDS (Family Trochilidae)
*Anna's Hummingbird *(Calypte anna)* Y-FC
*Allen's Hummingbird *(Selasphorus sasin)* B-FC
*Rufous Hummingbird *(Selasphorus rufus)* M-C, B-U

KINGFISHER (Family Alcedinidae)
*Belted Kingfisher *(Ceryle alcyon)* Y-FC

WOODPECKERS (Family Picidae)
*Northern Flicker *(Colaptes auratus)* Y-C
*Downy Woodpecker *(Picoides pubescens)* Y-U
*Hairy Woodpecker *(Picoides villosus)* Y-U
*Pileated Woodpecker *(Dryocopus pileatus)* Y-U
Red-breasted Sapsucker *(*Sphyrapicus ruber*)* Y-R

FLYCATCHERS (Family Trannidae)
*Olive-sided Flycatcher *(Contopus borealis)* B-U
*Western Wood-Pewee *(Contopus sordidulus)* B-U
*Pacific Slope Flycatcher *(Empidonax difficilis)* B-FC
*Black Phoebe *(Sayornis nigricans)* W-U, B-R
Hammond's Flycatcher *(Empidonax hammondii)* M-R
Eastern Kingbird (*Tyrannus tyrannus)* V

SHRIKES (Family Lannidae)
Northern Shrike *(Lanius excubitor)* W-R

VIREOS (Family Vireonidae)
*Hutton's Vireo *(Vireo huttoni)*Y-U
*Warbling Vireo *(Vireo gilvus)* M-U, B-R
Cassin's Vireo *(Vireo cassinii)* M-R

JAYS/CROWS/RAVENS (Family Corvidae)
*Steller's Jay *(Cyanocitta stelleri)* Y-FC
*American Crow *(Corvus brachyrhynchos)* Y-C
*Common Raven *(Corvus corax)* Y-C

HORNED LARKS (Family Alaudidae)
Horned Lark *(Eremophila alpestris)* M-R, W-R

SWALLOWS (Family Hirundinidae)
*Tree Swallow *(Tachycineta bicolor)* B-FC
*Violet-green Swallow *(Tachycineta thalassina)* B-FC
*Purple Martin *(Progne subis)* B-R (?)
*Northern Rough-winged Swallow *(Stelgidopteryx serripennis)* B-U
*Barn Swallow *(Hirundo rustica)* B-C
*Cliff Swallow *(Hirundo pyrrhonota)* B-U
Bank Swallow *(Riparia riparia)* M-R

CHICKADEES (Family Paridae)
*Black-capped Chickadee *(Parus atricapillus)* Y-U
*Chestnut-backed Chickadee *(Parus rufescens)* Y-FC
Mountain Chickadee *(Parus gambeli)* V

BUSHTITS (Family Aegithalidae)
*Bushtit *(Psaltriparus minimus)* Y-U

NUTHATCHES (Family Sittidae)
*Red-breasted Nuthatch *(Sitta canadensis)* B-U, W-I

CREEPERS (Family Certhiidae)
* Brown Creeper *(Certhia americana)* W-U, B-R

WRENS (Family Troglodytidae)
*Marsh Wren *(Cistothorus palustris)* Y-C
*Bewick's Wren *(Thryomanes bewickii)* Y-U
*Winter Wren (*Troglodytes troglodytes)* W-C, B-R
House Wren *(Troglodytes aedon)* M-R

KINGLETS (Family Regulidae)
Ruby-crowned Kinglet *(Regulus calendula)* W-C
*Golden-crowned Kinglet *(Regulus satrapa)* Y-FC

THRUSHES (Family Turdidae)
Western Bluebird *(*Sialia mexicana*)* M-R
Varied Thrush *(Ixoreus naevius)* W-FC
Townsend's Solitaire *(Myadestes townsendi)* V
*Swainson's Thrush *(Catharus ustulatus)* B-C
Hermit Thrush *(Catharus guttatus)* W-FC
Veery *(Catharus fuscescens*) V
*American Robin *(Turdus migratorius)* Y-C

WRENTIT (Family Timaliidae)
*Wrentit *(Chamaea fasciata)* Y-C

MIMIC THRUSHES (Family Mimidae)
Northern Mockingbird *(Mimus polyglottus)* V

STARLINGS (Family Sturnidae)
European Starling *(Sturnus vulgaris)* Y-R

PIPITS (Family Motacillidae)
American Pipit *(Anthus rubescens)* M-C, W-U

WAXWINGS (Family Bombycillidae)
*Cedar Waxwing *(Bombycilla cedrorum)* B-U

WARBLERS (Family Parulidae)
*Orange-crowned Warbler *(Vermivora celata)* B-C, W-R
Nashville Warbler *(Vermivora ruficapilla)* M-R
Yellow Warbler *(Dendroica petechia)* M-U
*Yellow-rumped Warbler *(Dendroica coronata)* Y-C
*Black-throated Gray Warbler *(Dendroica nigrescens)* B-U
MacGillivray's Warbler *(Oporornis tolmiei)* M-R
*Common Yellowthroat *(Geothlypis trichas)* B-C
*Wilson's Warbler *(Wilsonia pusilla)* B-U
Hermit Warbler *(Dendroica occidentalis)* M-R
Townsend's Warbler *(Dendroica occidentalis)* W-U
Palm Warbler *(Dendroica palmarum)* M-R, W-R

TANAGERS (Family Thraupidae)
*Western Tanager *(Piranga ludoviciana)* B-FC

SPARROWS (Family Emberizidae)
*Song Sparrow *(Melospiza melodia)* Y-C
Lincoln's Sparrow *(Melospiza lincolnii)* W-U
*White-crowned Sparrow *(Zonotrichia leucophrys)* Y-C
Golden-crowned Sparrow *(Zonotrichia atricapilla)* W-C
White-throated Sparrow *(Zonotrichia albicollis)* W-R
Fox Sparrow *(Passerella iliaca)* W-C
*Dark-eyed Junco *(Junco hyemalis)* W-FC, B-U
*Savannah Sparrow *(Passerculus sandwichensis)* B-FC, W-R
Chipping Sparrow *(Spizella passerina)* M-R
*Spotted Towhee *(Pipilo maculatus)* Y-FC
*Oregon Vesper Sparrow *(Pooecetes gramineus affinis)* B-R
Lapland Longspur *(Calcarius lapponicus)* M-U, W-R

GROSBEAKS/BUNTINGS (Family Cardinalidae)
*Black-headed Grosbeak *(Pheucticus melanocephalus)* B-U
Lazuli Bunting *(Passerina amoena)* M-R

BLACKBIRDS (Family Icteridae)
*Red-winged Blackbird *(Agelaius phoeniceus)* Y-U
*Brewer's Blackbird *(Euphagus cyanocephalus)* Y-R, B-R
*Brown-headed Cowbird *(Molothrus ater)*B-FC
Western Meadowlark *(Sturnella neglecta)* W-U
Common Grackle *(Quiscalus major)* V

FINCHES (Family Fringillidae)
*Pine Siskin *(Carduelis pinus)* B-U, W-I
*American Goldfinch *(Carduelis tristis)* B-C, W-R
*Purple Finch *(Carpodacus purpureus)* B-C, W-U
House Finch *(Carpodacus mexicanus)* Y-R
*Red Crossbill *(Loxia curvirostra)* Y-I
Evening Grosbeak *(Coccothraustes vespertinus)* M-U

WEAVERS (Family Passeridae)
*House Sparrow *(Passer domesticus)* Y-R, B-R (?)

Mammals

* indicates potential for the species to occur, as suggested by range maps and other references

OPOSSUMS (Family Didelphiidae)
Virginia Opossum (*Didelphis virginianus)*

SHREWS (Family Soricidae)
Vagrant Shrew (*Sorex vagrans)*
Trowbridge Shrew (*Sorex trowbridgii)**
Pacific Shrew (*Sorex pacificus*)*

MOLES (Talpidae)
Shrew Mole (*Neurotrichus gibbsii*)*
Townsend Mole (*Scapanus townsendii*)*
Coast Mole (*Scapanus orarius*)*

EVENING BATS (Family Vespertilionidae)
Little Brown Bat (*Myotis lucifugus*)
Long-Eared Myotis (*Myotis evotis*)*
Hoary Bay (*Lasiurus cinereus*)*
Townsend's Big-Eared Bat (*Corynorhinus townsendii*)*
Long-Legged Myotis (*Myotis volans*)*
California Myotis (*Myotis californicus*)
Big Brown Bat (*Eptesicus fuscus*)
Yuma Myotis (*Myotis yumanensis*)
Silver-Haired Bat (*Lasionycteris noctivagans*)*

RABBITS (Family Leporidae)
Brush Rabbit (*Sylvilagus bachmani*)

SQUIRRELS (Family Sciuridae)
California Ground Squirrel (*Spermophilus beecheyi*)
Western Gray Squirrel (*Sciurus griseus*)
Northern Flying Squirrel (*Glaucomys sabrinus*)
Townsend's Chipmunk (*Eutamias townsendi*)*

POCKET GOPHERS (Family Geomyidae)
Western pocket Gopher (*Thomomys mazama*)

BEAVERS (Family Castoridae)
American Beaver (*Castor Canadensis*)

MICE, VOLES, AND MUSKRATS (Family Cricetidae)
Deer Mouse (*Peromyscus maniculatus*)
Long-Tailed Vole (*Microtus longicaudus*)
Townsend's Vole (*Microtus townsendii*)*
Creeping Vole (*Microtus oregoni*)*
Bushy-Tailed Woodrat (*Neotoma cinerea*)
Muskrat (*Ondatra zibethicus*)*

RATS (Family Muridae)
Norway Rat (*Rattus norvegicus*)*
Black Rat (*Rattus rattus*)*
House Mouse (*Mus musculus*)*

JUMPING MICE (Family Zapodidae)
Pacific Jumping Mouse (*Zapus trinotatus*)*

PORCUPINE (Family Erethizontidae)
Porcupine (*Erethizon dorsatum*)

FOXES (Family Canidae)
Coyote (*Canis latrans*)
Red Fox (*Vulpes vulpes*)

BEARS (Family Ursidae)
Black Bear (*Ursus americanus*)

RACCOON (Family Procyonidae)
Raccoon (*Procyon lotor*)

WEASEL, SKUNK, OTTER, MINK, MARTEN (Family Mustelidae)
Long-tailed Weasel (*Mustela frenata*)
Striped Skunk (*Mephitis mephitis*)
River Otter (*Lutra canadensis*)
Mink (*Mustela vison*)
American Marten (*Martes Americana*)

CATS (Family Felidae)
Mountain Lion (*Felis concolor*)
Bobcat (*Lynx rufus*)

DEER (Family Cervidae)
Blacktailed Deer (*Odocoileus hemionus columbians*)
Roosevelt Elk (*Cervise elaphus roosevelti*)*

HAIR SEALS (Family Phocidae)
Harbor Seal (*Phoca vitulina*)

EARED SEALS (Family Otariidae)
Steller Sea Lion (*Eumetopias jubatus*)*
California Sea lion (*Zalophus californianus*)*

Amphibians

* indicates potential for the species to occur, as suggested by range maps and other references

MOLE SALAMANDERS (Family Ambystomatidae)
Northwestern Salamander (*Ambystoma gracile*)
Pacific Giant Salamander (*Dicamptodon ensatus*)*

LUNGLESS SALAMANDERS (Family Plethodontidae)
Clouded Salamander (*Aneides ferreus*)
Southern torrent Salamander (*Rhyacotriton olympicus*)*
Ensatina (*Ensatina eschscholtzi*)*
Dunn's Salamander (*Plethodon dunni*)*
Western Redbacked Salamander (*Plethodon vehiculum*)*

NEWTS (Family Salamandridae)
Roughskin Newt (*Taricha granulosa*)

TREE FROGS (Family Hylidae)
Pacific Treefrog (*Ascaphus regilla*)

BELL TOADS (Family Leiopelmatidae)
Tailed Frog (*Ascaphus truei*)*

TRUE FROGS (Family Ranidae)
Redlegged Frog (*Rana aurora*)
Bullfrog (*Rana catesbeiana*)

Reptiles

* indicates potential for the species to occur, as suggested by range maps and other references

SEA TURTLES (Family Cheloniidae)
Green Sea Turtle (*Chelonia mydas*)*
Logger-head Sea Turtle (*Caretta curetta*)*
Pacific Ridley Sea Turtle (*Lepidochelys olivacea*)*

SEA TURTLES (Family Dermochelyidae)
Leather-back Sea Turtle (*Dermochelys coriacea*)*

WATER AND BOX TURTLES (Family Emydidae)
Northwestern Pond Turtle (*Clemmys marmorata*)

ALLIGATOR LIZARDS (Family Anguidae)
Northern Alligator Lizard (*Elgaria coerulea*)*

IGUANIDS (Family Iguanidae)
Western Fence Lizard (*Sceloporus occidentalis*)
Sagebrush Lizard (*Sceloporus graciosus*)*

SKINKS (Family Scincidae)
Western Skink (*Eumeces skiltonianus*)*

BOAS (Family Bioidae)
Rubber Boa (*Charina bottae*)

COLUBRID SNAKES (Family Colubridae)
Northwestern Garter Snake (*Thamnophis ordinoides*)*
Common Garter Snake (Thamnophis sirtalis)*
Western Terrestrial Garter Snake (*Thamnophis elegans*)*

Appendix E
Fish Habitat Use and Life History

Coho Salmon

Coho salmon are native to the Floras Creek and New River system. Large numbers of adult coho salmon once spawned in Floras Creek, Morton Creek, Butte Creek, Bethel Creek, and Fourmile Creek. All of these creeks feed into New River or its adjacent lakes and wetlands (Oregon Fish Commission 1967). Recent spawning surveys and interviews with local anglers indicate that the coho salmon population in the New River basin is at a fraction of its historic level. Historically, coho salmon used approximately 30 miles of stream in the system for spawning. Currently, coho use approximately 18 miles (Todd Confer, personal communication). Spawning surveys conducted from 1989 to 1993 show that Fourmile, Morton, Bethel, Butte, and Willow Creeks support moderate to high spawning densities of coho salmon, whereas Davis and Floras Creek support low spawning densities (Todd Confer, personal communication).

At one time the coho salmon population in the Floras Creek and New River system was about 2,500 adults. The current population, based on a five year average, is probably less than 500 adults and 150 jacks per year (ODFW 1989; Todd Confer, personal communication). In 1993, spawning escapement of salmon was 850 adults and 160 jacks; nearly double the estimate of the previous four years. This higher escapement may be partially attributable to reductions that occurred in ocean harvest or a slight improvement in ocean conditions.

Many factors have contributed toward the decline in salmon in the New River basin. Factors include: elimination of wetlands, channel straightening, removal of riparian vegetation and large woody material, increased sediment yields from timber harvesting activities, introduction of warm-water fish species to freshwater lakes, and low summer flows and high water temperatures brought on by drought and agricultural water use. The overall reduction in wetlands and introduction of warm-water fish (i.e., largemouth bass) to Floras Lake, New Lake, and Croft Lake, may in combination, have eliminated prime year-round lake-rearing habitat for young salmon.

After hatching from eggs and emerging from the gravel, coho salmon commonly rear in freshwater for one to two winters as fingerlings before making their seaward migration as smolts. Their preferred habitat includes deep pools and off channel areas in their nursery streams, as well as lakes, ponds, and open wetlands. These lake and stream features provide coho salmon with rearing habitat throughout the year. They are especially important in providing slow moving water and abundant cover for young fish to wait out winter floods. During summer, coho have been observed in New River in the vicinity of New Lake outlet. Juvenile coho may utilize habitat in New Lake and other freshwater lakes during winter high flows, but drop down into New River during lower flows. Braided and meandering channels in New River near New Lake outlet contain abundant undercut bank and edge habitat which provide excellent cover for salmon and trout. Sample data in 1989 and 1991 indicates that juvenile rearing in New River may grow up to 20 mm in length between June and September (USDI BLM 1991).

In 1972 and 1973, Trask River stock of coho salmon juveniles were released into Floras Lake, and in 1981, several hundred thousand Rogue River stock fry were released (ODFW 1989). Since 1981, Coquille River stock fry have been released sporadically by the Salmon Trout Enhancement Program (ODFW 1989).

Chinook Salmon

Fall Chinook salmon are native to the Floras Creek and New River system. The population currently consists of naturally produced fish and a few stray hatchery fish from other systems. However, there have been a few scattered releases of Elk River stock fall Chinook salmon fingerlings (released in 1973 and 1974), and Floras Creek stock fall Chinook salmon fry (released in 1983 and 1984). (ODFW 1989)

The Floras Creek and New River stock appears to be unique in that it comprises one of the best fall runs of exclusively wild fish on the southern Oregon Coast (Westfall 1987, personal communication in USDI BLM 1987). However, little data has been collected to document characteristic life history traits, and the population has not been fully quantified. South coast stocks of fall Chinook salmon are listed as state sensitive critical and are considered at high risk of extinction (American Fisheries Society 1991).

Although data for Floras Creek and New River fall Chinook salmon is limited, their natural history appears to parallel that of stocks in the adjacent Sixes River basin (as described by Reimers 1971, Nicholas and Hankin 1988). Adult fish typically enter New River from mid-October to mid-December, with numbers peaking during late November. When the mouth is sealed by a sand bar (often into November), many fish swim over the low sand dune during high tide, or they wait until the mouth breaks open.

Most fish migrate up Floras and Willow creeks to spawn. Periodic spawning surveys since 1989 have not identified Chinook salmon in Davis, Bethel, Butte, and Morton Creeks (ODFW spawning survey data). Spawning takes place from mid-November through January, with a peak usually during mid-December (Nicholas and Hankin 1988). As with the adjacent Sixes River, the geographic location indicates that Floras Creek and New River stocks probably migrate north. Four year old fish make up the majority of female spawners (Nicholas and Hankin 1988).

Several life history types, or life cycles, of juvenile Chinook salmon were observed in the Sixes River basin. Reimers (1971) found that the most prevalent type (and most successful in surviving to return as adult spawners) reared for several months in freshwater streams, and then lived for several months in the estuary before entering the ocean in September and October. Other less successful types spent either more or less time in freshwater or entered the ocean quickly after having spent very little time in the estuary. The estuary provides a place where the fish can grow to large sizes and become conditioned to salt water, referred to as the smolt stage. This behavior seemed to improve survival at sea during some years.

Several weeks to months after emerging from the gravel in early spring, the young begin migrating down Floras Creek and New River. It is hypothesized that there are also several life history types in the Floras Creek and New River population. This variety of life history types provides the diversity needed for the population to recover from catastrophic environmental events such as flood or drought. Sampling efforts since 1985 indicate that juvenile Chinook salmon rear throughout New River and its estuary during summer (June through October). Smolts, juvenile fish that have begun their physical adaptation to saltwater, enter the ocean any time between June and October. The last of them are flushed out when the river breaches at the onset of fall and winter rain storms.

In some years, juvenile migration partially coincides with channel drying between Bono Ditch and New Lake outlet. Juveniles surviving migration through this low flow partially dry section take advantage of excellent rearing habitat down stream. Large, deep pools persist during drought periods in the braided channels near New Lake outlet. The 1992 sampling efforts showed that juvenile Chinook salmon grew about eight millimeters in length during July, but almost no growth occurred during August.

In comparison, juvenile Chinook salmon in Sixes River averaged 20 mm larger than New River fish at ocean entrance (Reimers 1971; Nicholas and Hankin 1988). Growth in New River may be limited by dwindling food resources after the mouth closes or by decreased stream flow and elevated water temperatures during late summer (USDI BLM 1992).

Even when flow is continuous throughout the summer, water temperatures in New River can reach 76°F. Acceptable water temperatures range from 45°F to 65°F. A continuous, uninterrupted surface flow in New River would allow fish to migrate through even shallow riffles, less than one-foot deep, and reduce the chance of temperature stress, mortality, and predation.

Winter Steelhead

Unlike Pacific salmon, steelhead do not always die after spawning, but may return to the ocean and spawn again in following years. Steelhead also differ from their salmonid cousins by rearing in freshwater for at least two years before migrating to the ocean. Juvenile steelhead have been observed throughout New River.

Steelhead are known to spawn in Floras, Willow, Morton, Butte, Bethel, Davis, and Fourmile Creeks, and their tributaries between February and April (Oregon Fish Commission 1967). Steelhead are known to migrate at least to the confluence of the North and South Forks of Floras Creek. From 1981 through 1986, The Salmon Trout Enhancement Program conducted annual releases of native stock winter steelhead into Floras Creek (ODFW 1989). Estimated catch of winter steelhead in the recreational fishery has ranged from 90 to 630 fish, with 250 on average, between the 1972 and 1987 seasons (ODFW 1989).

Cutthroat Trout

The population status of cutthroat trout in New River is unknown. Sea-run cutthroat trout in south coast basins are considered at moderate risk of extinction (American Fisheries Society 1991).

Cutthroat trout have been sampled throughout New River and many are caught in the recreational fishery. Sea-run cutthroat trout up to 16 inches in length use habitat in Floras Lake outlet and the braided mid-reaches of New River, where depth exceeds four feet during summer, and where undercut bank and overhanging vegetation habitat is abundant. Cutthroat trout spawn in Floras and Willow Creeks (Oregon Fish Commission 1967). An isolated population of resident cutthroat trout is known upstream from the cascades on Willow Creek.

Pacific Lamprey

In spring 2002, Pacific lamprey were sampled by a smolt trap in Floras Lake outlet. Most of those caught were ammocoetes; however, several adults were also caught. It is assumed that the ammocoetes are Pacific lamprey and not river lamprey or western brook lamprey, since ammocoetes from different species are difficult to distinguish. The distinguishing tooth patterns of the parasitic oral discs do not develop fully until the late stages of metamorphism. The ammocoetes move downstream during their development, and by the time eye and the naso-pineal glands are obvious, they would be nearly to the ocean to begin the parasitic phase of their life history. Out-migration may occur November through June; however, there are recordings of it occurring nearly year-round. The period of metamorphism may be long, or it may vary regionally (Kostow 2002).

It is unlikely that adults spawn within New River, since they select spawning gravels just upstream of riffles and often near slow-watered silty pools and banks. Adults will also spawn in areas prone to collect organic matter, which is ammocoete habitat. Pacific lamprey spawn within Floras Lake outlet and likely other places in the system where their habitat exists.

Pacific lamprey enter salt water and become parasitic, feeding on a wide variety of fish and occasionally whales. In turn, they are a preferred food for other fish and mammals as they provide more calories and nutrition than most fishes.

Lampreys are observed to spawn in the spring between March and May on the Oregon Coast. Most scientists believe that all lamprey die soon after spawning. However, the out-migration of several hundred apparently robust lampreys have been observed on the Olympic Peninsula (Kostow 2002). ODFW staff and volunteers on the south Oregon Coast believe that they have seen out-migration after spawning by some lamprey.

Pacific, western brook, and river lamprey are currently (2003) under petition with the USFWS for determination of listing under the Endangered Species Act.

Other Fishes

The total complement of fish species in the New River basin has not been completely sampled nor described. In addition to salmonids, several freshwater, estuarine, and marine fish species can be found in New River (Table 4).

Appendix F
New River ACEC Acreage

The previous version of the New River Management Plan based ACEC acreage figures on government lots, as described on the Master Title Plat. The Master Title Plat is the Bureau's record of title and is used mainly as a graphic display of township survey data. The Master Title Plat does not reflect title changes which are a result of lateral movement of rivers or other bodies of water, nor do they describe the portion of land lying between the meander line and mean high tide. County Tax Lot acreage is based on recorded private and cadastral surveys which include that portion of land lying between the meander line and mean high tide. For acquisition purposes both acreage figures are displayed in Tables 7-9.

Table 7. BLM lands originally designated as the New River ACEC located in Coos County

Township / Range	County Records	Master Title Plats
T. 30 S., R. 15 W.	Section 3 Portion of SE¼ Tax Lot Numbers (TLNs) 400,401 Encompassing 97.58 acres +/-	Section 3 Lots 3,4 Encompassing 75.58 acres +/-
	Section 10 Portion of W½ TLNs 500,501, 300,301 Encompassing 170.23 acres +/-	Section 10 SWSE,Lots1,2,3,4 Encompassing 129 acres +/-
	Section 15 NWNE,E½NW,NESW, E½SWSW TLNs 200,300 Encompassing 210.23 acres +/-	Section 15 NWNE, Lots 1,2,3,4 Encompassing 156.83 acres +/-
	Section 21 Portion of NESE,SENE TLNs 100,101 Encompassing 51.56 acres +/-	Section 21 Lot 2 Encompassing 22.36 acres +/-
	Section 22 W½NW, NWSW TLN 300 Encompassing 127.23 acres +/-	Section 22 NWSW, Lots 1,2 Encompassing 109.83 acres +/-
Total Original Acres	**656.83 acres**	**493.60 acres**

Table 8. BLM lands later added to the New River ACEC located in Curry County

Township / Range	County Records	Master Title Plats
T. 30 S., R. 15 W.	Section 32 Portion of SESE TLN 1100 Encompassing 2.18 acres +/-	Section 32 Lot 1 Encompassing 2.18 acres +/-
	Section 33 Portion of E½SWSW, NWSW. TLNs 1001, 1200 Encompassing 27.40 acres +/-	Section 33 Lot 2 Encompassing 27.40 acres +/-
Total BLM Lands Added to ACEC	**29.58 acres**	**29.58 acres**
Total BLM Lands designated as the New River ACEC	**686.41 acres**	**523.18 acres**

Table 9. Private lands acquired by BLM and added to the New River ACEC

Township / Range Name / County Acquisition Year	County Records	Master Title Plats
T. 30 S., R. 15 W. Toth Exchange Coos County 1986	Section 2 Portion of NWNW TLN 501 Encompassing 14.2 acres +/-	Section 2 Lot 2 Encompassing 14.2 acres +/-
T. 30 S., R. 15 W. Storm Ranch Purchase Coos County 1991	Section 2 W½SW TLN 700 Section 10 E½NE TLNs 100,200 Section 11 W½NW,W½SENW TLN 400 Encompassing 240.15 acres +/-	Section 2 W½SW TLN 700 Section 10 E½NE TLNs 100,200 Section 11 W½NW,W½SENW Encompassing 240.15 acres +/-
T. 30 S., R. 15 W. Hammond Purchase Coos County 1991	Section 28 S½NE,NWSE TLNs 900,901 Encompassing 111.66 acres +/-	Section 28 SENE, Lots 2,3 Encompassing 105.45 acres +/-

Township / Range Name / County Acquisition Year	County Records	Master Title Plats
T. 31 S., R. 15 W. Floras Lake Purchase Curry County 1994	Section 7 Portion of SESESE, TLNs 500,501 Section 8 Portion of E½NW,E½SWNW, N½SW,W½SWSW. Encompassing 129.51 acres +/-	Section 7 Lot 1, Section 8 Lots 3,4,5,6 Encompassing 111.48 acres +/-
T. 29 S., R. 15 W. Lost Lake Purchase Coos County 1994	Section 35 N½NENE TLN 100 Section 36 Portion of S½NWNENW,SWNENW, NWNW. Encompassing 71.08 acres +/-	Section 35 N½NENE TLN 100 Section 36 Portion of S½NWNENW,SWNENW, NWNW. Encompassing 71.08 acres +/-
T. 30 S., R. 15 W. Paullus Purchase Coos County 1995	Section 21 N½SESE TLNs 202,302 Encompassing 24.95 acres +/-	Section 21 Lot 1 Encompassing 32.78 acres +/-
T. 30 S., R. 15 W., W.M. Kahn Purchase Coos/Curry Counties 1995	Section 21 (Coos) S½SESE TLNs 201,301, Section 28 (Curry) Portion of N½NE TLNs 800,801 Encompassing 78.15 acres +/-	Section 21 (Coos) S½SESE TLNs 201,301, Section 28 (Curry) Lot 4 Encompassing 72.2 acres +/-
Total Acquired Lands Designated as ACEC	**669.70 acres**	**647.34 acres**
Total Public Lands Designated as ACEC	**686.41 acres**	**523.18 acres**
Grand Total ACEC Acreage	**1,356.11 acres**	**1,170.52 acres**

Appendix G
General Rules and Regulations

The following list includes general rules and regulations for visitors to the New River ACEC. This list summarizes key rules that have been developed from various management actions described in Part Three of this plan. These have been created to protect the unique natural, cultural, and recreation settings (i.e., roaded natural and semi-primitive non-motorized) of the area.

- **Motorized vehicles:** Motorized vehicles are limited to designated roads only. River Road is seasonally closed to vehicular traffic from March 15 through September 15 to minimize disturbance to Western Snowy Plovers nesting on the dunes west of the boat launch.

- **Pet leashing:** To minimize harassment of wildlife, pets must be leashed at all times. Exceptions are trained hunting dogs used for waterfowl hunting in designated areas during the proper season.

- **Camping:** Camping is allowed for educational, research, or work purposes. Beach camping is allowed under special circumstances for long-distance backpackers hiking the Oregon Coast Trail and requires a special permit issued by the BLM. Two-week advance notice is required.

- **Campfires:** Open campfires are prohibited except by special permit. Camp stoves are allowed without prior approval.

- **Hours of operation:** The New River ACEC is open year-round from sunrise to sunset.

- **Seasonal beach restrictions:** Designated dry sand portions of the beach above mean high tide are closed to the public from March 15 through September 15 to protect nesting Western Snowy Plovers.

- **Special forest products:** The collection of any forest product within the ACEC is prohibited. Forest products include but are not limited to: mushrooms, Christmas trees, boughs, ferns, salal, huckleberry, firewood, grass, cattail, post and poles, driftwood, wildflowers, and seed. Special permits may be authorized to collect plants and/or animals for educational or research purposes.

- **Waterfowl hunting:** Waterfowl hunting is allowed on BLM land along New River south of Croft Lake outlet pursuant to all applicable state and federal regulations. Waterfowl hunting north of Croft Lake outlet is prohibited for public safety reasons. All other forms of hunting and trapping are prohibited within the ACEC except by special permit.

- **Fishing:** Sport fishing is allowed within the New River ACEC according to all applicable state and federal regulations.

- **Weapons:** For public safety, the discharging of firearms is prohibited within the ACEC. Shotgun use for legal waterfowl hunting is permitted along New River south of the Croft Lake outlet only.

- **Boating:** Boating on New River is allowed in accordance with all applicable state regulations.

- **Minerals:** The New River ACEC is closed to locatable (mining claims) and salable (construction sand and gravel) mining.

- **Bicycles and horses:** Bicycles and horses are permitted on trails designed for their use.

Appendix H
Monitoring and Evaluation Guidelines for Managing Recreational Use

Purpose

BLM has developed an on-going monitoring and evaluation process to guide recreational use management at New River in order to avoid unacceptable impacts to the natural resources and recreation settings (i.e., roaded natural and semi-primitive non-motorized) of the area. This process is similar to the Limits of Acceptable Change (LAC) planning system developed by the U.S. Forest Service for wilderness areas (Stankey et al. 1985). However, in order to adapt the LAC process to management at New River, only certain components of the framework have been incorporated. The intent remains the same: to maintain an appropriate balance between protecting resource values and providing recreational opportunities for the visiting public.

After attempting to apply all nine steps of the LAC process at New River, we recognized the limitations of applying it to such dynamic biological systems. These complex systems are not only affected by recreational impacts, but by a wide range of variables that occur both within and outside the boundaries of the ACEC. Because of this, it is difficult to attribute impacts to these ecosystems directly with a change in recreational use. Moreover, there is a lack of data available to measure all aspects of these natural systems, which further limits our ability to understand the dynamics involved.

Process

Monitoring and evaluating recreation use at New River places emphasis on maintaining desired conditions rather than how much use the area can tolerate. The process includes: (1) identify potential issues and concerns resulting from changes in recreation use, (2) develop appropriate criteria for measuring change in resource and social conditions, (3) routinely monitor resource and social conditions relative to these concerns, (4) routinely evaluate if unacceptable changes to those conditions are occurring from recreation use, and if necessary, implement an alternative management action to quickly remedy a situation. The process is proactive and establishes a framework for accountability, enabling the BLM to more effectively manage New River for both resource protection and recreational use.

Steps 1 and 2 establish the framework for managing visitor-use-related changes, which have already been completed. Steps 3 and 4 are on-going and may trigger management actions needed to avoid unacceptable impacts before they occur. The following describes each of the four steps selected for the New River ACEC.

Please note that this process only addresses recreational activities legally sanctioned by the BLM. It does not include conflicts or impacts resulting from illegal activities (e.g., collecting forest products, using off-road vehicle, disturbance to cultural resources, non-permitted camping, etc.). Illegal activities are dealt with separately through law enforcement strategies and compliance monitoring. BLM does not tolerate any illegal activities; therefore no acceptable level of change exists.

Step 1. Potential issues and concerns resulting from recreational use

The New River ACEC contains a wide variety of outstanding ecological and recreational values that warrant special management attention. Understanding the potential issues and concerns associated with these values is an important step to maintaining a balanced approach to visitor use management of the area. Table 10 identifies potential resource impacts and social conflicts that may result from changes in recreation use. The table does not include all possible problems, but it does provide a starting point for the evaluation process.

Table 10. Potential issues and concerns that may result from changes in recreational use

Area	Activity	Potential Resource Impacts	Potential Social Conflicts
Along roads parking areas, trailheads, and boat launches	Sightseeing from or near vehicles	• Excessive noise from frequent vehicle traffic may disturb wildlife (i.e., breeding song birds) • Disturbance to migratory birds using the river near the boat launch, especially during fall migration when the lower gate to the river is open to vehicles • Riparian vegetation impacts near boat launch caused by excessive foot traffic or parking off roadway • Wildlife killed by passing vehicles	• Overcrowding (too many visitor encounters) • Increased vehicle traffic to and from boat launch area (includes speeding along narrow gravel road used by other motorists, hikers, bicyclists, and horseback riders) • Traffic congestion due to limited parking • Traffic congestion due to limited turn-around opportunities for RVs and other large vehicles • Safety concerns with increase in vehicle traffic near picnic areas, learning center, and other higher use areas
New River and other waterways with the ACEC (i.e., Floras Lake and Croft Lake outlets)	Boating	• Disturbance to wildlife (e.g., migratory birds, birds of prey, breeding plovers) caused by an increase in human presence on the river and adjacent habitats made more accessible.	• Overcrowding and conflicts between user groups (i.e., waterfowl hunters during fall hunting season)
	Fishing	• Excessive pressure on salmonid populations caused by an increase in the number of fish caught • Riparian vegetation impacts near boat launch caused by excessive foot traffic • Disturbance to migratory birds on river (especially near the boat launch where the majority of people fish) • Increase in trash along river from lures/bait containers, etc.	• Overcrowding, particularly along the river near boat launch during peak fishing season • Social conflicts between commercial guides, duck hunters, boaters, and other users
	Duck Hunting	• Disturbance/harassment to waterfowl using the river as a stop-over during fall migration • Increase in trash along river from spent shotgun shells, temporary blinds	• Overcrowding during hunting season • Conflicts between hunters and other user groups (safety concerns for boaters, fishermen, and hikers at viewpoints along river)
Trail system (i.e., trails at Storm Ranch, Floras Lake, Fourmile, and Lost Lake)	Hiking	• Disturbance to song bird populations during nesting season (March - August) caused by excessive noise, pets off leash, or human presence near nest sites • Development of side trails, multiple trails, increased trail width, and trash	• Overcrowding (excessive number of encounters with other trail users leads to loss of solitude) • Conflicts between user groups (bikers and horse riders) • Noncompliance of pet leash law (which may disturb other hikers, bikers, or horse riders)
	Horseback Riding	• Same as pedestrians, but increased potential for trail damage and off-trail use • Introduction of exotic plants from manure	• Conflicts with other user groups (hikers and bikers) • Need for additional parking for trailers (which is limited)
	Bicycling	• Same as above, especially development of side trails and off-trail use • Rutting of trails and increased erosion	• Conflicts with other user groups • Short trail loop at Storm Ranch may create a 'race track' effect for more experienced mountain bike users
Foredune and Beaches	Hiking, Camping	• Western Snowy Plover nest failures (March 15 - Sept 15), disturbance to migratory and resident shorebirds resulting from human presence • Increase in trash, fire rings, and other evidence from camping	• Overcrowding resulting in loss of solitude • Conflicts with other user groups
Other Areas	Off-trail exploration	• Development of unplanned trails • Disturbance to special status plant and animal populations • Vegetation trampling • Disturbance to song-bird nesting areas	• Conflicts with other user groups • Creation of new side trails may make it difficult for hikers to determine location of designated trails

Step 2. Criteria for Measuring Resource and Social Conditions

Criteria for measuring resource and social conditions within the ACEC have been established to help determine if unacceptable changes are occurring (Table 11). The criteria set for these conditions have specific, measurable standards associated with them that provide a basis for evaluation. For social conditions, the standards are set more to detect trends in recreation use and visitor satisfaction. An increasing trend in use does not indicate that a recreation impact is occurring; it simply highlights the need to focus more closely on the relationship between that change in use and the resource(s) associated with it.

Table 11. Criteria for Measuring Resource and Social Conditions

Resource or Social Condition	Monitoring Criteria	Standard
Song bird population abundance	Difference between the mean number of detections for eight species of song birds nesting along recreation trails and off-trail areas during the breeding season (March – August)	Two of the eight species monitored show significant change in the difference between the 'mean' over a two year period. Significant change occurs when the range of a confidence interval bar of one data set does not overlap with the range of a confidence interval bar of the previous year's data set for each species (as shown in Figure 2)
Quality of the physical environment in areas routinely used by visitors	Change in the physical condition of areas within established photo points along the roads, river, and trails	Photos show an increasing trend in degradation of areas adjacent to roads, parking lots, or along river banks; a widening or entrenchment of trails; development of new trails; and/or damage to adjacent vegetation in these areas
Level of Recreation Use	Change in the number of visitors and/or visitor use hours per recreational activity	A significant increasing trend or spike in recreation use not solely attributed to regular seasonal fluctuations in use
Level of Visitor Satisfaction	Change to the visitors' quality of experience while at New River	A significant increasing trend in the number of visitor encounters while on site, and/or the level of recreation impacts they observe; A significant decreasing trend in their ability to achieve solitude, and/or their overall quality of experience

Step 3. Monitoring Resource and Social Conditions

The routine monitoring of resource and social conditions is necessary to determine if changes are occurring. Although many natural resource-related projects within the ACEC are not directly linked to recreation use, a special monitoring component is being integrated into each project to help determine if recreational impacts are occurring. In addition to this general approach, more specific monitoring programs are in place to track changes to resource and social conditions that are directly related to visitor use.

Resource Conditions

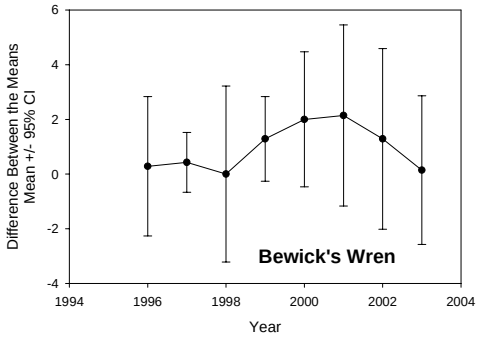
Programs currently in place to monitor the unique botanical, wildlife, and fisheries resources throughout the ACEC are primarily tied to habitat restoration and special status species recovery. These programs include: monitoring coastal dune habitat, riparian vegetation, river hydro-dynamics, the Western Snowy Plover, coho salmon, western lily, silvery phacelia, and pink sand-verbena. However, these programs are not specifically geared toward identifying the affects of visitor use activities. An exception to this is the recovery program for the snowy plover. An aspect of this program does monitor visitation, but the focus is measuring levels of noncompliance (i.e., dogs off leash, access within nesting areas, etc.).

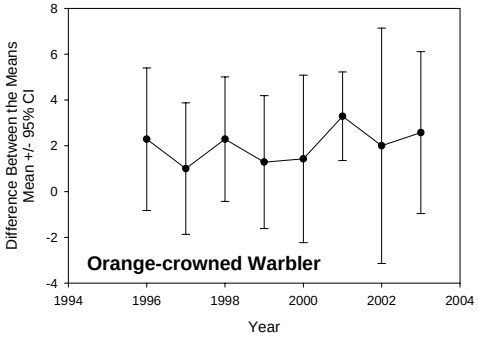
There are two on-going programs that lend themselves well to monitoring visitor-use-related changes; the migratory song bird study and various photo point monitoring projects. The following describes these two programs that are used to gauge potential adverse impacts resulting from BLM-sanction recreation uses within the ACEC.

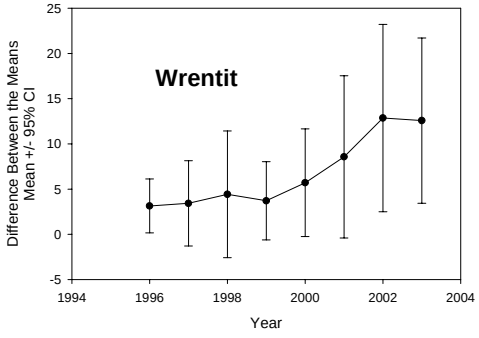
Since 1996, a monitoring program has been in place to monitor the conditions of eight species of breeding song birds that nest within the Storm Ranch portion of the ACEC (Rodenkirk 2003). This on-going project is used to establish a comparison between breeding bird species occurring in the vicinity of recreational trails and those occurring in off-trail areas. Since the population of each breeding bird species can vary from year-to-year due to external factors not related to conditions within the ACEC, the study is designed to show relational differences between control (off-trails) and treatment (along trails) areas. This is accomplished by comparing the difference between the mean number of detections of each species from year to year in both areas (Figure 9). For example, if the number of detections of a particular species fluctuates dramatically from one year to the next, but the relative difference in number of detections between the control and treatment areas are the same, then it is assumed that recreation use conditions have not significantly affected breeding song birds or their habitat within the ACEC.

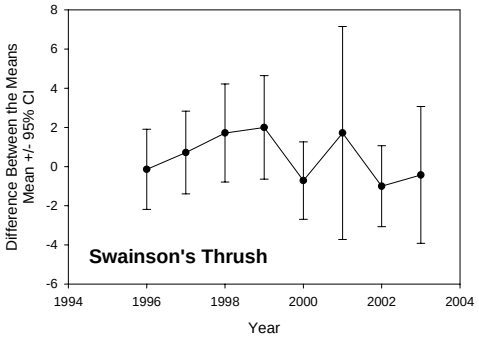
A photo point monitoring program is in place to track changes to the condition of areas routinely used by visitors. These photo points are used to document and assess the status and trend of the physical environment. Photo points are landscape or feature photographs that are retaken from the same position at each observation. Over time, the differences between years can be compared qualitatively. These photo points assess habitat conditions in order to monitor changes in recreation impacts. Six photo points have been established along the road and parking areas of Storm Ranch, two photo points along New River, and thirteen photo points throughout the trail system. A description of the methodology used for this purpose can be found in the New River ACEC Recreation Use Photo Point Monitoring Plan (Brian 2002).

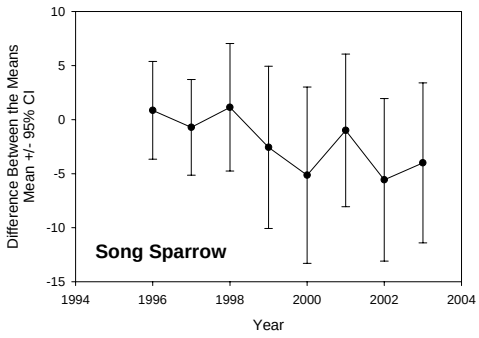
Figure 9. The following graphs compare the difference between the 'means' on control and treatment points for eight species of nesting song birds during the breeding season. The 'means' being compared are the average number of detections on all control and treatment points for one survey. These can be compared year-to-year to see if there is a significant difference. If the range of 'confidence interval' (CI) bars overlap from one year to the next, then there is no significant difference. Note that none of the individual graphs show significant differences to date.

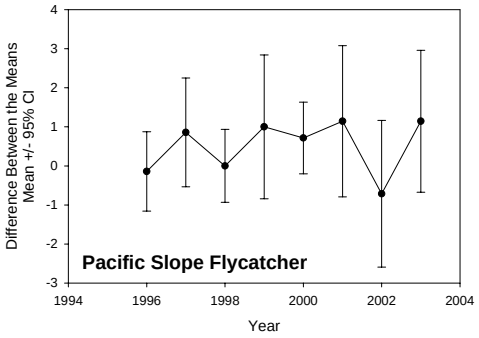


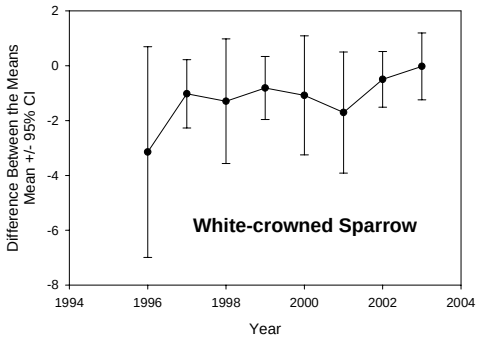


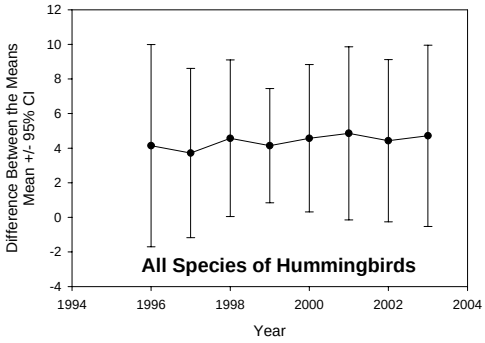












Social Conditions

Tracking changes to the recreation settings (i.e., roaded natural and semi-primitive non-motorized) at New River is also a necessary component of the monitoring process. Within the Storm Ranch portion of the ACEC, visitor use data is collected based on the methodology described in the New River ACEC Visitor Use Monitoring Plan (Church 2001). Emphasis is placed on monitoring recreation use at Storm Ranch since it is the primary public access to the ACEC. Visitor use levels are recorded by the site host on ten randomly selected sample days each month. An estimate of monthly use by each recreational activity is then calculated based on these observations. The sampling plan began in May 2001 and is on-going.

Monitoring data is organized by both the number of visitors and the number of 'visitor use hours.' A 'visitor use hour' is a unit of measurement used to determine how long a visitor participates in a particular recreation activity. For evaluation purposes, this duration is broken down into 15-minute increments. For example if four visitors spend 15 minutes driving through the site, they have spent one visitor use hour on site. If two fishermen spend three hours on site, they have spent six visitor use hours on site. Comparing visitors with 'visitor use hours' helps determine potential issues and concerns that may result from a particular recreation use.

Figures 10 through 15 show the results of the visitor use monitoring effort thus far. This data is being used by the BLM to help focus other on-going monitoring efforts to determine if any impacts to the resource condition or social setting are occurring from changes in visitation.

Figure 10. Number of Sightseers per Month – includes sightseeing along roadway from or near vehicle, picnicking, viewing interpretive exhibits, and rest stops (May 2001 – April 2004)

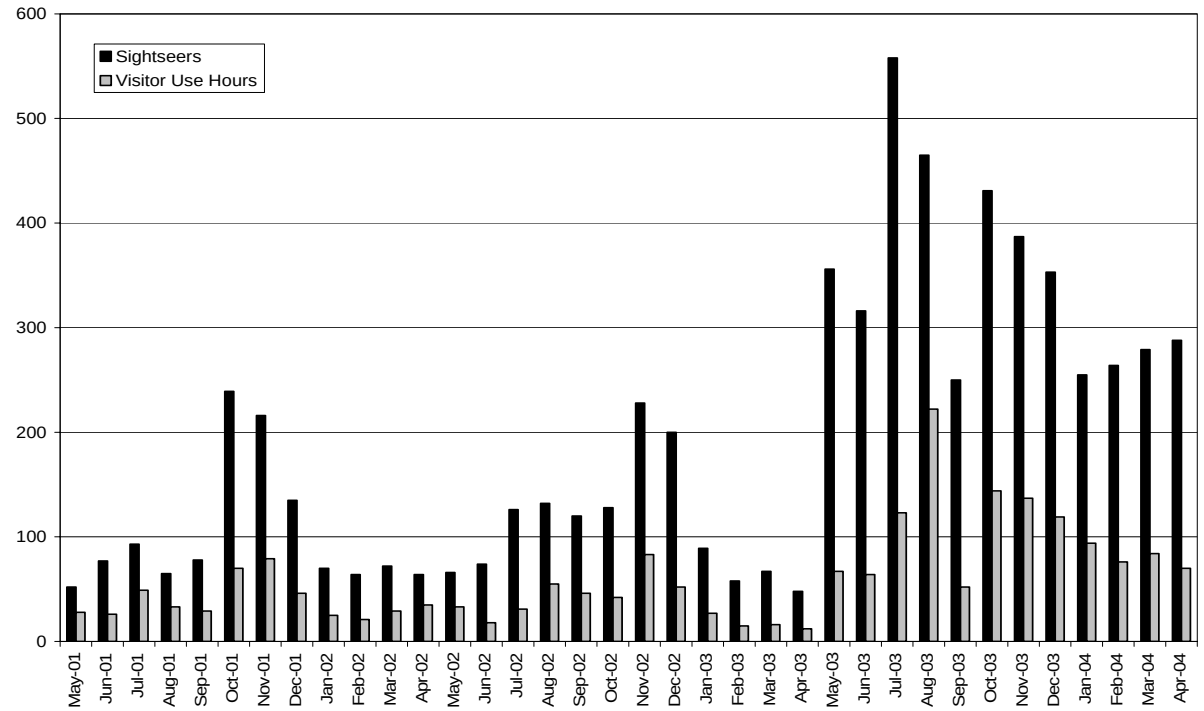


Figure 11. Number of Hikers per Month (May 2001 – April 2004)

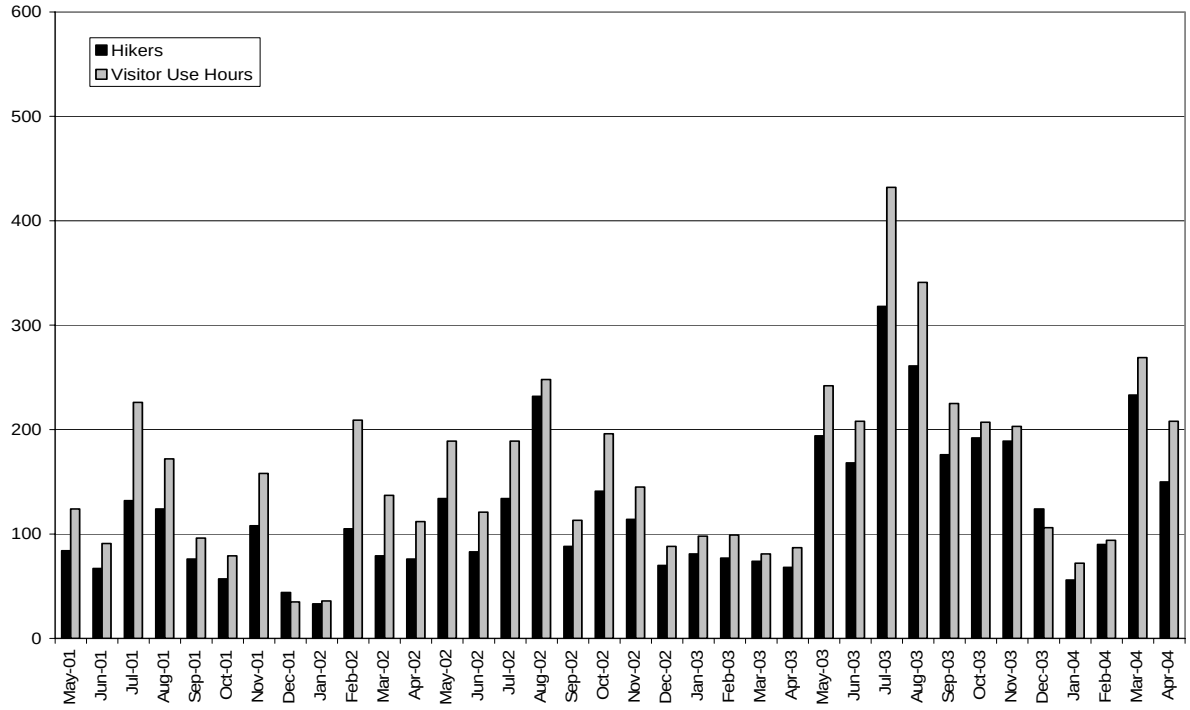


Figure 12. Number of Fishermen per Month – includes those using boats to access fishing areas along the river (May 2001 – April 2004)

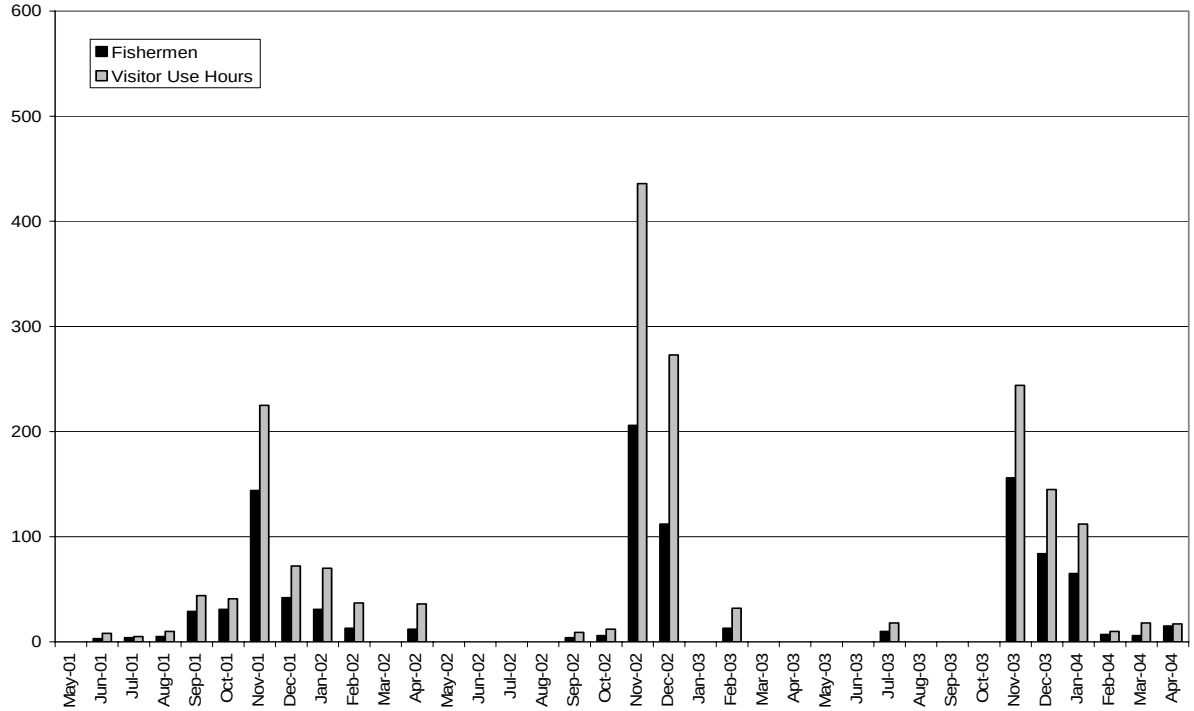


Figure 13. Number of Waterfowl Hunters per Month – includes those using boats to access hunting areas along the river (May 2001 – April 2004)

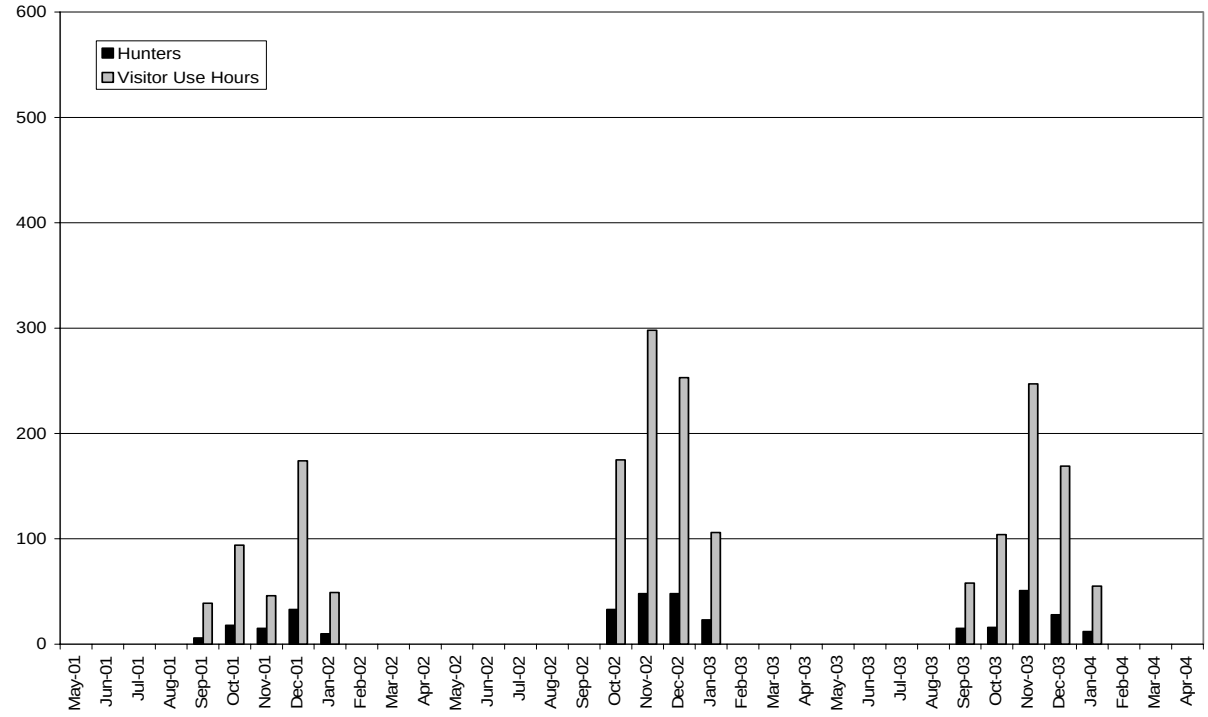


Figure 14. Number of Canoers or Kayakers per Month – excludes waterfowl hunters and fishermen with boats (May 2001 – April 2004)

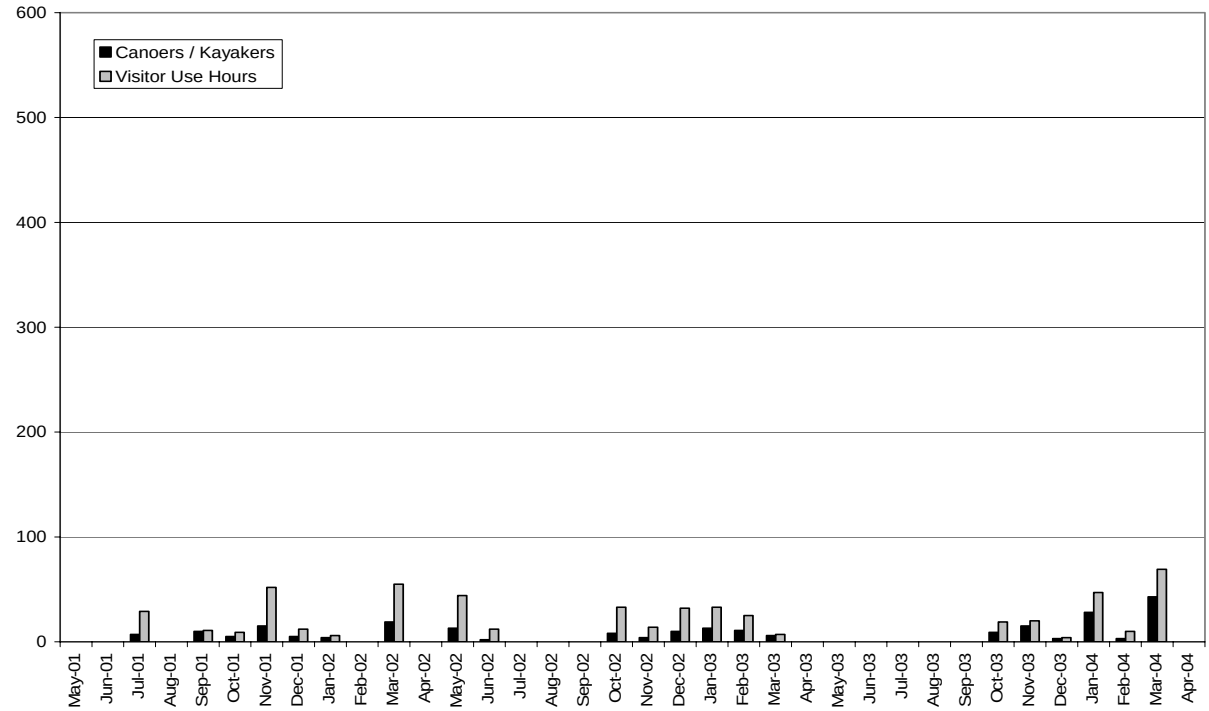
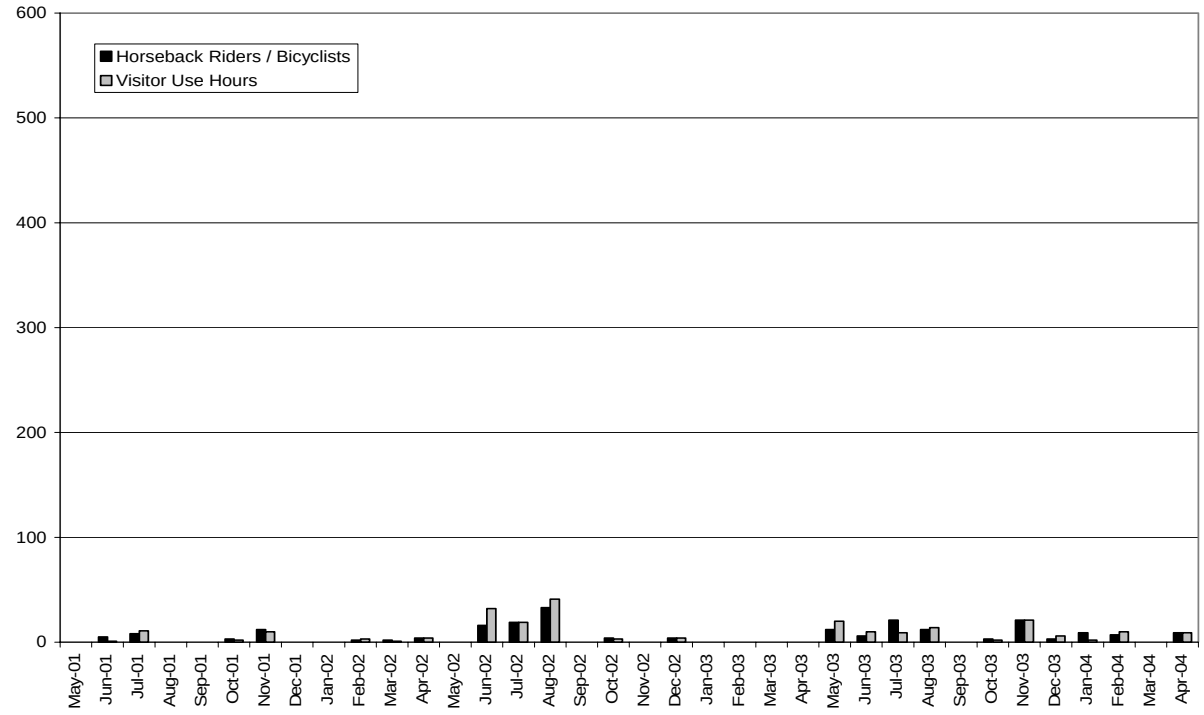


Figure 15. Number of Bicyclists and Horseback Riders per Month – these activities were combined on one graph due to their low visitor use levels (May 2001 – April 2004)



In addition to monitoring at Storm Ranch, seasonal employees collect data on visitor use levels at the Floras Lake portion of the ACEC during the summer snowy plover nesting season. Trail and road counters at this and other locations throughout the ACEC are also used to determine general visitor use levels throughout the year.

A visitor use survey is also in place to track changes to visitors' quality of experience while at New River. The survey is primarily designed to collect information about their impressions of the recreation settings (i.e., roaded natural and semi-primitive non-motorized) within Storm Ranch. It asks questions about: the number of visitor they encountered while on site; the level of solitude they achieved; concerns they have regarding resource impacts; the overall quality of their experience; and other questions relating to the types of activities they participated in, frequency of visits, distance traveled to the site, etc. The survey was first implemented in the summer of 2003 and is on-going. Key visitor responses from the 2003 survey are summarized below. (Church 2004)

Figure 16. New River Visitor Survey Results (August 2003 – April 2004, *based on 145 surveys*)

Survey Question: How many people (other than your group) did you see today in the following areas?
(Average number of people seen per visitor)

Main parking lot:	2.0
Boat launch area:	0.5
New River (away from boat launch):	0.2
Trails:	0.8

Was the number of other visitors in these areas too many for you to have a quality experience:
(Percentage of those who responded yes or no)

	Yes	No
Main parking lot:	3%	97%
Boat launch area:	1%	99%
New River (away from boat launch):	0%	100%
Trails:	0%	100%

Survey Question: Please circle the number that best reflects your opinion about New River:
(Percentage of those who responded yes per category)

Solitude is easily experienced at New River:

Strongly Disagree:	1%
Disagree:	3%
No Opinion:	8%
Agree:	13%
Strongly Agree:	75%

The level of natural resource impact from visitor use is currently low:

Strongly Disagree:	1%
Disagree:	2%
No Opinion:	14%
Agree:	21%
Strongly Agree:	62%

Survey Question: How do you rate the overall quality of your experience?
(Percentage of those who responded yes per category)

Excellent	72%
Good	25%
Fair	2%
Poor	1%

Step 4. Evaluate Changes and Selecting Alternative Management Actions

An interdisciplinary team will evaluate the results from monitoring resource and social conditions on an annual basis to determine if any significant changes are occurring. At a minimum, this team should include the ACEC manager, a recreation planner, botanist, and wildlife biologist. If necessary, other specialists may be needed to help address specific issues that may arise (e.g., fishery biologist, archaeologist, interpretive specialist, etc.). If the team determines a change is becoming unacceptable, they will recommend an alternative management action to reduce the resource impact or social conflict. Some of the management actions include gathering additional information to determine how significant a change is or how it relates to recreational use.

A list of alternative management actions has been developed to help resolve potential future issues (Table 12). These alternatives are suggestions for management and do not include all possible approaches. Alternatives were developed based on analyzing potential issues, concerns, and current conditions within the ACEC. The list of alternatives includes a progression of more stringent actions. Implementation of these actions should depend on the degree of social and/or resource impact. If less stringent actions are not effective at reducing the impact, then more rigorous management approaches should be considered. Once an alternative management action is selected, it will then be implemented and monitored to determine its effectiveness at reducing the resource and/or social concern.

Table 12. Alternative Management Actions

Setting	Alternative Management Actions
Throughout the ACEC	• Expand visitor use monitoring efforts / surveys to better define the current social conditions and the significance of any change in visitor use levels relative to social conditions (i.e., number of visitor encounters, types of social conflicts, degree of solitude, etc.). • Educate users about natural resource concerns and ways to reduce impacts while on site (i.e., hire an interpretive specialist to provide on-site programs, open learning center more regularly, provide guided hikes, etc.). • Encourage use outside peak visitation periods. • Determine if user conflicts or resource impacts are specific to a particular area, and if so, discourage use within that area (i.e., during breeding season or peak migration). • Determine if resource impacts are specific to a particular time of year or time of day, and if so, restrict or ration access during that time. • Provide additional interpretive or regulatory signs where needed to modify visitor behavior. • Increase law enforcement presence to encourage compliance with ACEC regulations. • Reduce number of visitors by establishing day-use fee, or issue permits/fees for certain recreational activities.
Roaded Areas	• Determine if the number of vehicles on site exceeds the maximum capacity of parking spaces available (if so, how often) • Install speed bumps, additional traffic signs, or other vehicle control measures • Limit the number of cars allowed to enter Storm Ranch during peak times if capacity is exceeded. • Revise or remove directional signs on Highway 101.

Setting	Alternative Management Actions
New River / other waterways	• Develop additional monitoring to determine if specific recreational activities are causing excessive disturbance to migratory birds, birds of prey, or other wildlife using the river. • Coordinate with ODFW to change fishing and/or waterfowl hunting regulations specific to New River. • Limit the number of waterfowl hunters accessing the river from Storm Ranch through the use of special use permits. • Coordinate with the Oregon State Marine Board to modify boating regulations to those more compatible with ACEC objectives.
Trails	• Encourage trail use during less crowded times to reduce number of encounters. • Install signs at key nesting areas along the trail to inform users to proceed with minimal noise/disturbance. • Encourage trail use outside of the breeding bird season. • Develop a more quantitative monitoring plan to evaluate the physical condition of the trails to determine if impacts are occurring. • Close or re-route sections of trail if excessive impacts occur. • Obliterate or discourage use of undesignated trails.

An Example of the Evaluation Process at Work

Results from the visitor use monitoring program show an increasing trend in sightseers after May 2003, when directional signs to the Storm Ranch portion of New River were installed on Highway 101. After further review of the data, it was determined that more people are visiting the site; however, a majority of them simply turn around at the main parking lot or take a quick rest stop before leaving. Note the difference between the number of sightseers and visitor use hours per month on Figure 2.

It was determined that an increase in vehicle traffic does not pose a measurable resource impact at this time, but it may affect the roaded natural setting of the area (e.g., traffic congestion in the parking lots and along road leading to the boat launch could reduce the opportunity for solitude). Based on anecdotal evidence, it was theorized that the 'Watchable Wildlife' logo (binoculars symbol) on the directional signs was somewhat misleading to travelers. This logo was originally designed to be used only for designated 'Watchable Wildlife' sites across the county. However, over the years it had been used by other agencies for all types of viewing areas, including: overlooks, scenic vistas, and other points of interest that can typically be seen from or near a vehicle.

Since wildlife viewing at New River is best approached by leaving your vehicle, BLM decided to change the binoculars logo on the highway signs to a hiking symbol in February 2004. The assumption is that less vehicle traffic will occur at New River if travelers along Highway 101 know ahead of time that the site does not offer a roadside viewing area. The visitor use monitoring program will continue to track these visitation changes over time to determine if this alternative management action is effective at reducing the amount of turn-around vehicle traffic.

Appendix I
Glossary

Aeolian: pertaining to the action or the effect of the wind, as in aeolian sand dune deposits.
Ammocoetes: juvenile lamprey, or larva; small, worm-like, and eyeless with filter-feeding mouths, gill slits, and narrow fins.
Area of Critical Environmental Concern: An area of BLM-administered lands where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes; or to protect life and provide safety from natural hazards (as defined in BLM Manuel 8300).
Bankfull: (1) The water level where the stream channel is flowing full, or just starts to overflow its natural banks. (2) A concept used in hydrologic analysis and geomorphology where the bankfull stage is identified (not necessarily at the top of a natural bank) and related to a certain return interval flow event.
Biodiversity: the full range of variety and variability within and among living organisms and the ecological complexes in which they occur.
Biome: a complex community of all living organisms, (e.g., grassland biome, woodland biome).
Bog: a wetland in which the water is acidic and comes only from precipitation that is relatively mineral-poor compared to groundwater; the substrate is accumulated organic material derived primarily from *Sphagnum*, graminoids (grasses, sedges, and rushes), and Ericaceous shrubs.
Breach: term used in this plan to explain an opening in the foredune between New River and the Pacific Ocean, caused by floodwaters, ocean surf run-up, or by planned mechanical intervention.
Cascadia seismic event: a rupture of the interlocked North American Plate and the Juan de Fuca Plate along the subduction planes. The energy released is expected to generate an 8.8 magnitude earthquake.
Cascadia subduction zone: the generally north-south zone along the Northwest coast where the Juan de Fuca Plate is being over-ridden by the North America Plate.
Cell: a unique ecosystem type of one or more ecosystem elements used to describe and evaluate natural areas.
Climax community: final or stable plant community in a successional series.
Community: a group of plants and animals that occupy a given locale.
Confidence interval: a statistical range with a specified probability that a given parameter lies within the range.
Coniferous: cone-bearing trees or shrubs; mostly evergreens such as pine, cedar, spruce, etc.
Cubic foot per second (cfs): a unit of measurement of the rate of water flow past a given point equal to one cubic foot in one second.
Deflation plain: area behind the foredune where wind has eroded the sand to the water table, forming a wet surface resistant to further erosion.
Disclimax: an enduring climax community altered by man's disturbance.
Dissipative beach: a portion of the shoreline that has a relatively gentle grade, the grain size is small, and is considered "more" stable.
Dune: a hill of drifting sand formed by wind action.
Ecosystem: an assemblage of integrated organisms plus the local environment.
Estuary: the zone between the fresh water of a stream and the salt water of an ocean. An estuarine system extends upstream until ocean derived salt measures less than 0.5% during average annual flow. Estuaries are low energy systems and may include subtidal and intertidal areas with aquatic beds.
Estuarine: of, relating to, or found in an estuary.
Exotic: introduced species; not indigenous to a given area.
Fen: a wetland in which the water is alkaline to only slightly acidic and has been in contact with mineral soil; the substrate is accumulated organic material derived primarily from graminoids (grasses, sedges,

and rushes) and bryophytes other than Sphagnum. In Oregon, there are apparently no truly natural bogs, and the acidic wetlands with *Sphagnum* are classified as poor fens.
Flow Duration: the relationship between the magnitude of stream flow and the proportion of the time being considered during which the flow was equaled or exceeded.
Foredune: an elevated accumulation of sand at the landward margin of the beach, usually stabilized by vegetation, primarily European beach grass. The tall ridges may reach heights of 25 to 35 feet and basal widths of over 320 feet.
Geomorphology: the science of the configuration of the earth's surface; the classification, description, nature, origin, and development of landforms and their relationships to underlying structures; and the history of geologic changes as evidenced in these surface landforms.
Good Friday Earthquake, 1964: a tectonic event that originated in Alaska. The earthquake occurred on March 27, 1964, Good Friday and was a 9.2 magnitude, the second largest earthquake ever recorded. The earthquake triggered a tsunami that impacted Pacific coastlines including Oregon, California, Washington, and Alaska.
Herbicide: a chemical substance capable of killing or inhibiting plants.
Interpretation: a communication process that forges emotional and intellectual connections between the interests of the audience and the inherent meanings in the resource.
Introduced species: also referred to as exotic species, these are plants or animals occurring as a result of introduction or unnatural range expansion. These are species that did not occur before the arrival of European culture.
Littoral cell: segment of the shore or beach that is bound by headlands which extend sufficiently seaward to prevent along-shore transport of beach sediment, creating a relatively closed sediment system.
Mean: a number that typifies a set of numbers, such as a geometric mean or an arithmetic mean; the average value of a set of numbers.
Mélange: a body of rock large enough to be mapped that includes fragments and blocks of other rock, both exotic and native, embedded in a fragmented and sheared matrix.
Metamorphic: a rock that has been subject to alteration of its original mineralogical, chemical, and structural characteristics due to pressure and/or heat.
Metasediment: a sediment or sedimentary rock that has evidence of being subject to partial or complete metamorphism.
Morphology: the study of the shape of the earth's surface including structure, form, and arrangement in relation to the development of landforms.
Native: a species indigenous to a given area; any species known to occur before the arrival of European culture or which has moved in through natural range extension.
Neotropical: of or originating from the biogeographic region stretching southward from the Tropic of Cancer and including southern Mexico, Central and South America, and the West Indies.
Non-vascular: refers to the lichens, fungi, liverworts, hornworts, and mosses.
Noxious weeds: any plant designated by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property.
Peak Flow: the maximum rate of discharge at a given point or from a given area, during a specified period.
Plagioclase: any of a common rock-forming series of triclinic feldspars, consisting of mixtures of sodium and calcium aluminum silicates.
Plant community: a general term for an assemblage of plants growing together at a site which show a definite association or affinity to each other
Pleistocene: in the geologic time scale, an epoch or period of the Quaternary. Its time frame is given as two to three million years before present until the beginning of the Holocene, approximately 8,000 to 10,000 years before present.
Precipitation ridge: the leading landward edge of a dune field at the point of advancement of the dune.

Quaternary: the second period of the Cenozoic era, made up by the Pleistocene and Holocene epochs. Its time frame is given as two to three million years before present until present.
Reach: a river or stream segment containing similar physical and biological characteristics.
Reflective beach: a portion of the shoreline that has a relatively steeper grade, composed of a larger grain size, and is considered less stable.
Riparian: living on or adjacent to a water supply such as a riverbank, lake, or pond.
Riverine: relating to or resembling a river, in this case a coastal freshwater system.
River mile: the measurement of distance in miles along a river beginning at the mouth or at the confluence of a higher order tributary.
Special Recreation Management Area: An area where a commitment has been made to provide specific recreation activity and experience opportunities. These areas usually require a high level of investment and/or management. They include recreation sites, but recreation sites alone do not constitute SRMAs (as defined in BLM Manuel 8300).
Special status species: animals and plants considered being of conservation interest because of their rarity or vulnerability to extirpation or extinction, or they are under-represented in protected areas.
Succession: the transition of plant species of a given area through a definite ecological stage (e.g., through succession of species composition, grasslands become tree-bearing forests).
Terrace: a wave-cut platform that has been exposed by either a land uplift or lowering of the sea level.
Terrestrial ecosystem: the name given to an assemblage of land-based species in a given locale, possessing some degree of interrelationship, generally reflected in consistency in dominant species and environment.
Threatened species: plants and animals listed as threatened on the Endangered Species List that are in danger of becoming extinct.
Vascular plants: refers to vessels or ducts that conduct fluids in plants; includes the fern and fern allies, gymnosperms, dicotyledons, and monocotyledons.
Visitor Use Hour: a unit of measurement that defines the amount of time a visitor(s) participates in a recreational activity (two visitors who spend three hours boating equals six visitor use hours).
Wetland: an area subjected to periodic inundation, usually with soil and vegetative characteristics that separates it from non-inundated area.

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